

Relationships between Listening and Speaking in Online Discussions: An Empirical Investigation

Alyssa Friend Wise, Simone Nicole Hausknecht, Yuting Zhao
Simon Fraser University, 250-13450 102 Avenue, Surrey BC, Canada, V3T 0A3
Email: afw3@sfu.ca, shauskne@sfu.ca, yza174@sfu.ca

Abstract: This study investigated relationships between how students “listen” (access existing posts) and “speak” (contribute posts) in asynchronous online discussions. Ten variables indexing four dimensions of students’ listening (breadth, depth, temporal contiguity and revisitation) and five variables indexing three dimensions of students’ speaking (discursiveness, depth of content and reflectivity) were calculated for 31 students participating in six week-long online discussions as part of an undergraduate educational psychology course. Multi-level mixed-model linear regressions indicated that responsiveness of students’ posts was positively predicted by how often they revisited previously read peer posts, and negatively related to a greater number of posts in the discussion overall. Post content quality was predicted by the percentage of posts viewed that students actually read (as opposed to scan). Put together, results suggest that when students take the time to read and re-read their peers’ posts there are related benefits in the quality of the posts they contribute.

Introduction

Asynchronous discussions are often seen as a powerful venue for knowledge construction due to their affordances for thoughtful commentary and reflective responses (Lipponen, 2002). The core premise is that learners build their ideas collectively and individually through dialogue; thus well-designed and supported online discussions can contribute to learning. Various mechanisms have been proposed to explain such learning including articulating one’s ideas, receiving feedback on these, socio-cognitive conflict caused by exposure to divergent views, the taking of multiple perspectives into account, and the internalization of collaborative activity (Stahl 2005; Lipponen, 2002). In common, all depend on two basic interrelated processes that learners must engage in: “speaking” (contributing posts to the discussion); and “listening” (accessing existing posts) [Wise et al., 2013]. When learning discussions are truly collaborative, these two activities are intimately related and inform each other. In contrast, if learners do not attend to others’ posts (or do so in an incoherent way) the “discussion” that results is more akin to a series of parallel monologues, explaining the findings of shallow and disjointed conversations noted by various researchers (e.g. Thomas, 2002; Webb et al 2004).

Previous research has informed our understanding about the ways in which learners engage in the activities of speaking and listening in online discussions (e.g. Pena-Shaff & Nicholls, 2004; Hewitt, 2003; Ho & Swan, 2007; Wise et al., 2013) but heretofore not connected the two. This is important because the interrelationship (or lack thereof) between the activities of speaking and listening may be an important factor contributing to the extent to which asynchronous discussions live up to or fall short of their possibilities for supporting knowledge construction. In this study we bridge this gap by examining how students’ listening and speaking behaviors relate to each other. This work connects to the conference theme of learning across levels as the interdependent processes of individuals within the context of groups are examined over time.

Theoretical Framework

While the metaphorical language of speaking and listening refers to real-time spoken conversations; in online discussions these activities take a different form. In “listening” learners engage with the text-based expressions of others’ ideas at their discretion and on their own timeline (Jonassen & Kwon, 2001); in “speaking” they exercise decisive control over the timeline for composing their thoughts, and when and where in the conversation they contribute. This temporal flexibility and decoupling of participation timelines changes the dynamics of discussions, allowing time for reflection and the opportunity to revisit comments already “heard,” but also creating challenges for managing discussions that proliferate in one’s absence (Lipponen, 2002; Peters & Hewitt, 2010). New categories with which to characterize these behaviors also emerge.

Conceptualizing Dimensions of “Listening” in Online Discussions

Previous work (Wise et al., 2012a; 2012c; 2013) has conceptualized different dimensions to characterize the ways in which students attend to the posts of others and has explored different approaches students take in such online listening. At a basic level, students can differ in the breadth and depth with which they view their classmate’s contributions. The *breadth* with which students attend to others’ posts is important in terms of the diversity of ideas that they are exposed to and their ability to respond to the discussion as a whole, while the *depth* with which they attend to these posts is an indication of the degree to which they are considering others’

ideas. For example some students “cover” the conversation by opening a large percentage of their classmate’s posts but spending little time on them, while others attend to only a portion of discussion posts but focus on them deeply (Wise et al., 2012a). Because students are in control of their own timelines of participation (Jonassen & Kwon, 2001) it is also necessary to consider the *temporal contiguity* of students’ listening; for example the degree to which they disperse or concentrate their participation. Finally, online discussions permit *revisitation* activities in which students can choose to return to posts (made by themselves and others) that they have attended to previously. Students’ bias towards reading new posts (Hewitt, 2003), however, may limit the frequency with which such revisitation actually occurs. Generally richer listening behaviors along each of these dimensions (greater breadth, depth, contiguity and revisitation) are thought to be more desirable for interactive dialogue in online discussions; however, such connections need to be examined empirically. To theorize and test potential relationships with specificity we must first conceptualize qualities of speaking along several dimensions as well.

Conceptualizing Aspects of “Speaking” Quality in Online Discussions

The different characteristics, functions and qualities of posts in online discussions have been theorized by many researchers (for a selected overview see reviews by De Wever et al, 2006 and Hew et al., 2010). Examined together, three common dimensions can be seen as important in almost all models: discursiveness (that learners’ comments refer to each other in meaningful ways); content (that the learning material is thoughtfully considered); and reflectivity (that the learning process itself is taken as an object for examination). Each of these dimensions is expanded on below.

First, for discussions to function as interactive dialogues rather than a series of parallel monologues (Boulos & Wheeler, 2007), posts need to contain *discursive* elements through which participants link their comments to each other. These elements can be responsive (e.g. expressions of social support, proposing consensus) or elicitive (e.g. asking questions). Responsiveness itself can take many forms; at a basic level a simple act such as acknowledging others may create the social support required for individuals to build trust to take risks within a discussion (Cheung et al., 2008). At a deeper level, when students respond to the ideas in a post they may expand or challenge that student’s (and others’) existing thinking, and when they respond to multiple ideas synthetically they can initiate a process of developing collective understanding (Gunawardena, et al., 1997). Similarly by eliciting responses from others, students contribute to the interactivity of the dialogue.

In addition to discursiveness, the depth with which academic *content* is discussed is central to the learning. A common way to assess this across multiple discussion topics draws on the argumentation literature and looks at the degree to which students make claims, and use reasoning, evidence, and theory to support them (e.g. Lin et al. 2012; Weinberger & Fischer, 2006). The underlying notion is that richer argumentation structures (more content-related claims and the greater use of supporting evidence, and theory) indicate deeper consideration of the learning material. Finally, the opportunity for *reflectivity* has been cited as a particular advantage of asynchronous online discussion since time-unlimited review of earlier parts of the discussion is possible (Harasim, 2000; Knowlton, 2005). Within a discussion, a student may consider the process of the group’s knowledge construction (Knowlton, 2005), but also the development of their own ideas on a topic. Thus target of reflection may be the learning process at either the group or individual level.

Put together, these five elements (responsiveness, elicitation, argumentation, individual reflection, and group reflection) across three dimensions (discursiveness, content, and reflectivity) provide a useful framework with which to examine the contributions a post makes to a discussion. In the next section we describe theoretically predicted relationships between these aspects of speaking quality and the dimensions of listening described above.

Connecting Speaking and Listening Activity

Theoretically, speaking and listening are intimately interrelated activities in the process of constructing knowledge though online discussions; however such connections have not yet been examined empirically. In this section we explicate the logic by which we would conceptually expect them to relate using the dimensions of speaking and listening outlined previously. Considering *breadth* of listening, as students attended to a greater proportion of their peer’s posts, we would expect them to be more *discursive* in their own comments, responding to and eliciting ideas from them. In addition as they become aware of a greater number of perspectives and views on the discussion topic, they are also likely to create posts with more sophisticated *argumentation* that supports, and perhaps qualifies, their position with respect to these other views. *Depth* of listening would also be expected to support *discursiveness* and *argumentation* as a richer understanding of peers’ ideas would support more thoughtful responses and questions, as well as lead to richer content as students carefully support or qualify their ideas based on this understanding. Turning to *revisitation*, rereading of already viewed peer posts suggests additional consideration of the ideas contributed by others, and thus would be expected to further support *discursiveness* and *argumentation* in the ways described above. Returning to ideas considered (or contributed) previously also can support the process of *reflection* on both group and individual

learning processes. *Temporal dispersion* may also support *reflection*; if students distribute their participation over a greater period of time and number of sessions they may be more likely to notice changes in their own and others' views. In contrast the *temporal contiguity* of conducting listening and speaking actions in the same session may be needed as a foundation for relationships between the two activities to be established.

Research Questions

1. What listening behaviors are associated with the discursiveness of a student's post in terms of responsiveness and elicitation?
2. What listening behaviors are associated with the depth of content of a student's post in terms of argumentation?
3. What listening behaviors are associated with the reflectivity of a student's post in terms of individual and group reflection?

Methods

Learning Environment and Participants

Students in a fully online undergraduate course on educational psychology participated in six week-long small-group discussions with 8-10 classmates. Discussions were conducted in three two-week sets (weeks 3/4, 8/9 and 11/12); the instructor gave students both group and individual feedback after the first two discussions (worth 5% of the course grade) and the latter four (worth 20%). Each week, students were asked to discuss contrasting perspectives on an authentic educational controversy and come to a collective position with rationale. Students were required to contribute at least two posts per topic and given guidelines for expectations of post quality in line with the dimensions of discursiveness, content, and reflectivity discussed above. Thirty-one of 52 students enrolled in the course consented to have data on their discussion participation collected for this study.

Data Extraction and Variable Calculations

Listening Variables

Clickstream (log-file) data was collected on all actions students took in the system to assess listening activity; action types were "view" (opening others' posts), "post" (creating a post), or "review" (revisiting previously read posts). Times between subsequent actions were subtracted to calculate duration, actions were divided into sessions-of-use, and views were subcategorized as scans or reads based on a maximum reading speed of 6.5 words per second (wps) [see Hewitt et al., 2007]. Ten variables were calculated for the different listening dimensions (see Table 1).

Table 1. Summary of ten listening variables along four dimensions

Dimension	Variable	Definition
Breadth	Percentage of others' posts viewed	# of unique posts made by others that a student viewed* divided by the total # of posts made by others
	Percentage of others' posts read	# of unique posts made by others that a student read* divided by the total # of posts made by others
Depth	Percentage of real reads	# of times a student read others' posts divided by their total # of views
	Average length of real reads (min)	Total time a student spent reading posts, divided by the number of reads
Temporal Contiguity	Number of sessions	# of times a student logged-in to the discussion
	Percentage of sessions with posts	# of sessions in which a student made a post, divided by their total # of sessions
	Participation range (days)	# of days between when a student first and last logged-in
Revisitation	Reviews of own posts	# of times a student reread posts they made
	Reviews of instructors' posts	# of times a student reread posts made by the instructor
	Reviews of other' posts	# of times a student reread posts made by others they had viewed previously

*Views include all accessing of others posts. Reads include only posts viewed slower than 6.5 wps

Speaking Variables

All 479 posts made by participants were extracted from the discussion tool and coded by two researchers for the five speaking variables (along three dimensions) described previously to evaluate post quality. The post was used as the unit of analysis for both theoretical and practical reasons as this was the unit through which students expressed their ideas in interaction with others and it presented an unambiguous basis for segmentation. The discursive dimension was assessed through the degree of students' Responsiveness to others' posts [$\kappa = 0.71$] and Elicitation that invited responses from others [$\kappa = 0.91$] to capture the degree to which a posts attempted to connect to preceding and subsequent discussion. The content dimension was assessed as richness of Argumentation [$\kappa = 0.74$], which captures the depth with which the academic content was considered. Finally the reflectivity dimension was evaluated through the degree to which students exhibited Reflection on their Individual Learning Process [$\kappa = 0.83$] and Reflection on the Group's Learning Process [$\kappa = 0.75$] to assess the degree to which students considered the process of knowledge construction either as an individual or for the group. Coding was based on a combination and adaptation of prior schemes and models by Hara et al. (2000), Knowlton (2005), Pena-Shaff & Nicholls (2004), Weinberger & Fischer (2006), and Wise et al. (2012d); see Table 2 for an overview of the scheme used.

Table 2. Overview of coding scheme for speaking variables

Discursiveness	
<i>Responsiveness</i>	<i>Elicitation</i>
0 None	0 None
1 Acknowledging	1 Questions not clearly directed to anyone
2 Responding to an idea	2 Questions directed to one person
3 Responding to multiple ideas	3 Questions directed to the group
Content	
<i>Argumentation</i>	
0 No argumentation	
1 Unsupported argumentation (Position only)	
2 Simple argumentation (Position + Reasoning)	
3 Complex argumentation (Position + Reasoning + Qualifier/preemptive rebuttal)	
Reflectivity	
<i>Reflection on Individual Learning Process</i>	<i>Reflection on Group Learning Process</i>
0 No individual reflection	0 No group reflection
1 Shallow individual reflection	1 Shallow group reflection
2 Deep individual reflection	2 Deep group reflection

Statistical Analysis

Multi-level mixed-model linear regressions for each speaking variable on predicted relevant listening variables were conducted to examine relationships. Because students' discussion behaviors may change across a series of discussions, aggregating data across the entire semester could obscure relationships between listening and speaking behaviors. Thus, models were based on variable averages calculated for each discussion week, the unit of activity in the course. For each model, the explanatory variables of interest were included as fixed effects (see Table 3) while effects of group-membership, discussion-week, group-by-week interactions (operationalized as # of posts per group), students-nested-within-groups and student-by-week interactions (operationalized as # of posts per student) were included as random effects. Backwards elimination was used to iteratively remove explanatory variables and refit equations until all remaining variables had $p < .10$. The two post-count variables remained in the model regardless of their significance. The alpha level used for interpretation was .05.

Results

Summary Statistics

There was great diversity in listening and speaking behaviors in the discussions. Although all students logged in the forum at least once each discussion set, some engaged in minimal participation with no posting and little attention to the posts of others, while others logged-in multiple times and read every post in the discussion (see Table 4). The number of posts in each discussion ranged from 13 to 52. The average level of responsiveness was at the mid-point of the scale, while elicitation was low and argumentation was high, though all varied substantially. Reflection on both individual learning and group processes was consistently low.

Table 3. Listening Variables Included in Regression of Each Speaking Variable

<i>Listening Dimensions</i>	Speaking Variables				
	Responsiveness	Elicitation	Argumentation	Individual Reflection	Group Reflection
<i>Breadth</i>	% of others' posts viewed % of others' posts read	% of others' posts viewed % of others' posts read	% of others' posts viewed % of others' posts read		
<i>Depth</i>	% of real reads Av. length of real reads	% of real reads Av. length of real reads	% of real reads Av. length of real reads		
<i>Temporal Contiguity</i>	% of sessions with posts	% of sessions with posts	% of sessions with posts	# of sessions Participation range	# of sessions Participation range
<i>Revisitation</i>	# of reviews of: -other students' posts	# of reviews of: -other students' posts	# of reviews of: -other students' posts	# of reviews of: -own posts -instructors' posts -other students' posts	# of reviews of: -own posts -instructors' posts -other students' posts

Table 4. Summary Statistics for Data Aggregated by Student and Discussion

Variable	Mean	S. D.	Min	Max
<u>Speaking Quality Variables</u>				
Responsiveness	1.51	0.78	0.00	3.00
Elicitation	0.52	0.72	0.00	3.00
Argumentation	2.17	0.81	0.00	3.00
Reflection on Individual Learning	0.27	0.34	0.00	1.67
Reflection on Group Process	0.33	0.33	0.00	1.50
<u>Speaking Quantity Variables</u>				
# of posts made (by group)	29.60	8.46	13	52
# of posts made (by student)	2.57	1.60	0	10
<u>Listening Variables</u>				
Percentage of others' posts viewed	0.72	0.31	0.00	1.00
Percentage of others' posts read	0.50	0.28	0.00	1.00
Percentage of real reads (not scans)	0.44	0.21	0.00	1.00
Average length of real reads (in min)	3.85	3.21	0.00	17.35
Number of sessions	6.96	5.23	0	29
Percentage of sessions with posts	0.40	0.26	0.00	1.00
Participation range (days)	4.08	1.87	0	7
Number of reviews of own posts	2.56	3.21	0	18
Number of reviews of instructors' posts	10.30	11.23	0	93
Number of reviews of other students' posts	10.67	11.17	0	55

Multi-level Regressions

Modeling results indicated that the responsiveness of students' posts was related both to the number of reviews of other students' posts and the total number of posts made by the group in a particular discussion week. Number of reviews of other students' posts was a positive predictor (greater reviewing of others' posts in a discussion week was associated with the making of more responsive posts) while the total number of posts made by the group was a negative predictor (a greater number of posts made by a group in a week was associated with lower average responsiveness in group members' posts). The level of elicitation in students' posts was also predicted by the number of reviews of other students' posts; however in this case the relationship was negative (more elicitive posts by a student in a discussion week was associated with less reviewing of others' posts). Richness of argumentation was predicted only by the percentage of posts viewed that students actually read (as opposed to scanned). This relationship was positive (a greater percentage of reading in a discussion week was associated with richer argumentation in the posts made). Neither individual nor group reflection was predicted by any of the listening variables.

Table 5. Summary of fixed effects standardized regression coefficients for models of five speaking variables

		Estimate	Standard Error	t value
<i>Responsiveness</i>	# of Posts per group	-0.018	0.009	-2.06*
	# of Posts per student	0.021	0.031	0.68
	Reviews of other' posts	0.013	0.005	2.50*
<i>Elicitation</i>	# of Posts per group	-0.001	0.007	-0.19
	# of Posts per student	0.047	0.035	1.34
	Reviews of other' posts	-0.016	0.006	-2.65*
<i>Argumentation</i>	# of Posts per group	-0.003	0.009	-0.33
	# of Posts per student	-0.041	0.024	-1.71
	Percentage of real reads	0.522	0.257	2.03*
<i>Individual Reflection</i>	# of Posts per group	-0.000	0.004	-0.10
	# of Posts per student	-0.024	0.017	-1.40
	Reviews of other' posts	0.005	0.003	1.66
<i>Group Reflection</i>	# of Posts per group	-0.003	0.005	-0.51
	# of Posts per student	-0.017	0.015	-1.17

* $p < .05$

Discussion

The major finding of this study is the relationship between listening (in terms of depth and revisitation of others posts) and quality of speaking (in terms of discursiveness and argumentative quality). While a connection between listening behaviors and speaking quality has been proposed theoretically (Wise et al., 2012a; 2013) and is implicit in much research on online discussions, this is the first work we are aware of that provides direct empirical evidence to support the connection. Below we discuss the specific relationships found, contextualizing them in the larger framework of prior research on online discussions.

Discursiveness is an important dimension of speaking in online discussions because it is what links individual comments together as a dialogue. Responsiveness can vary from simply social acknowledgements to building on or challenging individual ideas to synthetically integrating multiple perspectives (Gunawardena et al., 1997). The positive relationship found between revisiting others' posts and responsiveness suggests that the richer end of this spectrum tends to occur when posts are attended to multiple times. Examples of such behavior have been found in previous research on online discussion we conducted using a microanalytic case-study approach. In one study (Wise et al., 2012a) we found that a student characterized as interactive in her discussion participation always spent substantial time reading and re-reading others' posts before making her own, highly responsive, posts. In another extreme example (Wise et al., 2012c) a student who often built on others posts and synthesized the group discussion always located her post as a reply to a post she had viewed at least three times already.

Put together, this research suggests an important role for reviewing previously read posts in effective discussion participation. It is reasonable that students may need to read others' posts multiple times to make sense of them in the context of the discussion before being able to respond to the ideas with a complex and thoughtful response. However, prior research has documented students' tendency to do just the opposite; that is focus on only new posts (Hewitt, 2003). Recent work that has attempted to address this problem of new post

bias through the design of a discussion forum interface that encourages students to read and re-read posts in a connected fashion (Marbouti, 2012) may thus prove particularly valuable.

In contrast to the positive relationship found between revisitation and responsiveness, a negative association was found between revisitation and elicitation. This can be interpreted in several different ways. It is possible that rereading previously viewed peer posts helps students clarify some of the questions or doubts they had when they viewed those posts the first time, leading them to ask fewer questions. However, elicitation relates not only to clarification but also raising wonderings to the group. Thus another possible interpretation is that when learners repeatedly set questions to the group, they were more likely to focus their energies on the new responses to these, rather than posts they had read previously. Finally, it is important to note that overall levels of elicitation in the discussions studied were low; thus it is possible that this finding is due to the actions of a small sub-set of the population and of limited generalizability. This is clearly an area that requires further investigation.

The final relationship found for discursiveness was that responsiveness was negatively predicted by a greater amount of posts in the overall discussion. This is consistent with previous findings that a large amount of posts in a discussion lead students to feel overwhelmed (Peters & Hewitt, 2010) and suggests that it may be beneficial to make groups small, thus keeping discussions at a manageable size which allows students to be responsive as part of an interactive dialogue.

Considering argumentation, previous work has questioned whether it is breadth of listening, depth of listening, or a combination of the two that is important to support the richness of post content (Wise et al., 2013). The finding here of a relationship between the percent of posts read (not scanned) and richness of argumentation clearly indicates depth as the more relevant dimension. This aligns with the finding of a relationship between rich responsiveness and post revisitation since returning to a previously viewed post to consider it again could be considered as deep listening in conceptual sense. Logically it makes sense that deep attention to peers' posts can support a richer understanding of meaning and thus stronger argumentation as this understanding drives students to consider and support or qualify their own ideas more deeply. This may help explain part of the mechanism by which conscientious design of online discussion forums can encourage rich argumentation (Lin et al, 2012). In combination with the lack of findings for listening breadth it also provides empirical evidence to support our previous assertion that listening deeply to some of a discussion may be preferable to listening shallowly to all of it (Wise et al., 2013).

Unfortunately, here again research shows us that students tend to do the opposite of what is beneficial, focusing on breadth rather than depth. For example in one of the prior set of cases studies mentioned above, we found evidence of two students who viewed almost all the posts in their discussion, but without drawing on their ideas in their own posts (Wise et al., 2012a). On deeper inspection it seemed that their purpose for viewing posts differed, for one student it appeared to be an effort to "cover" the discussion content, while for the other it was to be able to acknowledge others' posts in a social manner. Additionally, in a larger cluster analysis of student listening behaviors we found that the apparent difference in breadth between two clusters of students was somewhat dissipated by a follow-up analysis revealing that while the "broad" listeners did view all the posts, they spent the majority of their listening efforts in concentrated activity examining a smaller number of posts in depth (Wise et al., 2013). These findings, along with others indicating that students often use widespread scanning as a strategy for coping with high-volume discussions (Wise et al., 2012b; Peters & Hewitt 2010), suggest that students do not instinctively know how to listen effectively in online discussion, and that it is important to provide them with explicit instruction about how to do so.

Conclusion and Study Significance

This study provides empirical evidence to support a relationship between listening behaviors (depth and revisitation) and quality of speaking (discursiveness and depth of content) in online discussions. This is an important area for research because speaking and listening are two interrelated aspects of participating in an online discussion, but previous research has not examined this connection. As shown in this study, patterns in listening can help explain and predict patterns in speaking. Specifically, when students take the time to read and re-read some number of their peers' posts, there are related benefits in the quality of the posts they contribute. The connection between these listening behaviors and post qualities is particularly important given past studies suggesting weak student listening behaviors (Thomas, 2002) and tendencies to focus on reading only new posts or using scanning as a strategy for coping with high-volume discussions (Wise et al., 2012b; Peters & Hewitt 2010). In addition, while the bulk of guidance for students' participation in online discussions focuses on how to post, understanding what listening behaviors are associated with what speaking ones suggests new ways to support students in effective discussion participation. Future work will test the efficacy of providing students with listening guidance to support their speaking quality and expand this work to examine listening/speaking relationships in other kinds of discussion contexts.

References

- Boulos, M. N., & Wheeler, S. (2007). The emerging web 2.0 social software: An enabling suite of sociable technologies in health and health care education. *Health Information and Libraries Journal*, 24(1), 2-23.
- Cheung, W. S., Hew, K. F., & Ling Ng, C. S. (2008). Toward an understanding of why students contribute in asynchronous online discussions. *Journal of Educational Computing Research*, 38(1), 29-50.
- 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.
- Gunawardena, C. N., Lowe, C. A., & Anderson, T. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of Educational Computing Research*, 17(4), 397-431.
- Hara, N., Bonk, C. J. & Angeli, C. (2000). Content analysis of online discussion in an applied educational psychology course. *Instructional Science*, 28(2), 115-152.
- Harasim, L. (2000). Shift happens: Online education as a new paradigm in learning. *The Internet and Higher Education*, 3(1/2), 41-61.
- Hew, K., Cheung, W. & Ng, C. (2010). Student contribution in asynchronous online discussion: A review of the research and empirical exploration. *Instructional Science*, 38(6), 571-606.
- Hewitt, J. (2003). How habitual online practices affect the development of asynchronous discussion threads. *Journal Educational Computing Research*, 28(1), 31-45.
- Hewitt, J., Brett, C., & Peters, V. (2007). Scan rate: A new metric for the analysis of reading behaviors in asynchronous computer conferencing environments. *American Journal of Distance Education*, 21(4), 215-231.
- Ho, C.H. & Swan, K. (2007). Evaluating online conversation in an asynchronous learning environment: An application of Grice's cooperative principle. *Internet and Higher Education*, 10(1), 3-14.
- Jonassen, D. H., & Kwon, H. (2001). Communication patterns in computer mediated versus face-to-face group problem solving. *Educational Technology Research and Development*, 49(1), 35-51.
- Knowlton, D. S. (2005). A taxonomy of learning through asynchronous discussion. *Journal of Interactive Learning Research*, 16(2), 155-177.
- Lin, H., Hong, Z., & Lawrenz, F. (2012). Promoting and scaffolding argumentation through reflective asynchronous discussions. *Computers & Education*, 59(2), 378-384.
- Lipponen, L. (2002). Exploring foundations for computer-supported collaborative learning. In Stahl, G. (Ed.) *Proceedings of CSSL 2002* (pp. 72-81). Boulder, CO: ISLS.
- Marbouti, F. (2012). Design, implementation and testing of a visual discussion forum to address new post bias. Unpublished masters thesis. Burnaby, CA: Simon Fraser University.
- Pena-Shaff, J. B. & Nicholls, C. (2004). Analyzing student interactions and meaning construction in computer bulletin board discussions. *Computers & Education*, 42(3), 243-265.
- Peters, V. & Hewitt, J. (2010). An investigation of student practices in asynchronous computer conferencing courses. *Computers & Education*, 54(4), 951 - 961.
- Stahl, G. (2005). Group cognition in computer-assisted collaborative learning. *Journal of Computer Assisted Learning*, 21(2), 79-90.
- Thomas, M. J. W. (2002). Learning within incoherent structures: The space of online discussion forums. *Journal of Computer Assisted Learning*, 18(3), 351-366.
- Webb, E., Jones, A., Barker, P., & van Schaik, P. (2004). Using e-learning dialogues in higher education. *Innovations in Education and Teaching International*, 41(1), 93-103.
- Weinberger, A., & Fischer, F. (2006). A framework to analyze argumentative knowledge construction in computer-supported collaborative learning. *Computers & Education*, 46(1), 71-95.
- Wise, A. F., Hsiao, Y. T., Marbouti, F., Speer, J. & Perera, N. (2012a). Initial validation of "listening" behavior typologies for online discussions using microanalytic case studies. In J. van Aalst, J., K. Thompson, K., M. Jacobson, & P. Reimann (Eds.) *Proceedings of ICLS 2012* (pp. 56-63). Sydney, Australia: ISLS.
- Wise, A. F., Marbouti, F., Hsiao, Y. & Hausknecht, S. (2012b). A survey of factors contributing to learners' "listening" behaviors in asynchronous discussions. *Journal of Educational Computing Research*, 47(4), 461-480.
- Wise, A. F., Perera, N., Hsiao, Y., Speer, J. & Marbouti, F. (2012c). Microanalytic case studies of individual participation patterns in an asynchronous online discussion in an undergraduate blended course. *Internet and Higher Education*, 15(2), 108-117.
- Wise, A. F., Saghafian, M. & Padmanabhan, P. (2012d). Towards more precise design guidance: Specifying and testing the functions of assigned student roles in online discussions. *Educational Technology Research and Development*, 60(1), 55-82.
- Wise, A. F., Speer, J., Marbouti, F. & Hsiao, Y. (2013). Broadening the notion of participation in online discussions: Examining patterns in learners' online listening behaviors. *Instructional Science*. 41(2), 323-343.