

Online Discussion or Authentic Dialogue? How Design Affects Discussions in Two Alternative Types of Online Forums

Structured Practitioner Notes

What is already known about this topic

- A vital practice for scholarly dialogue and democratic discourse is uptake: building on what others have written or said
- Instead of encouraging uptake of others' words and ideas, typical online discussions in Learning Management Systems can inadvertently isolate students in separate threads

What this paper adds

- We introduce and analyze two new, innovative types of online discussions that may encourage more uptake of others' words and ideas
- To eliminate isolation and encourage uptake, a linear chat forum makes all posts visible, but may produce interruptions, or “tangles”
- A forum that includes collaborative responsive writing requires participants to converge on a collective response, encouraging dialogue and overcoming tangles

Implications for practice/policy

- Teachers and other stakeholders might consider how discussion forum designs in Learning Management Systems can support or limit authentic dialogue
- Practitioners might consider how to incorporate deliberation about a shared focus into online discussions.
- Instructors might avoid tangles by aligning assignment purposes with dialogic principles: posing authentic questions that invite multiple interpretations and require uptake of others' responses.

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Abstract

Authentic dialogue demands that we respond, interpret, and sometimes disagree with others' ideas—a key component of participation in a democratic society. Yet the sharing and uptake of different ideas can be hampered by traditional online platforms which divide students into isolated threads. To tackle this issue, we introduce two novel online forums designed to foster engagement and idea exchange: a linear chat, akin to SMS, and a collaborative writing forum we call CREW. Seventy-three graduate students, divided into 18 small groups, tested these forums. We used discourse analysis to measure idea uptake and other dialogic features. From this analysis, seven discussions emerged as particularly interactive and engaging, exhibiting a high uptake-to-turn ratio. We noticed linear chat encouraged a high proportion of uptake, but also produced "tangles"—breaks in related post chains. CREW discussions sparked similar engagement but resolved most tangles since they required a collaborative written response. This study offers fresh insights in both research and teaching for improving online discussions. (161)

Introduction

Authentic dialogue isn't just talk—it's responding, interpreting, and even disagreeing with others' ideas. Such dialogic discussion, which embraces communal decision-making and inquiry, is crucial to effective participation in a democratic society (Parker, 2001). Schools prime students for dialogue, a skill vital across cultures, disciplines, age groups, and digital platforms (Applebee et al., 2003; Cambridge Primary Review Trust, 2017; Wegerif, 2013; Nystrand et al., 1997).

However, typical online Learning Management Systems (LMSs) may unravel this dialogic potential by separating students' posts into isolated threads, thereby limiting the uptake of others' ideas (Hewitt, 2001; Sherry, 2021). How might teachers foster vibrant dialogic discussions online?

Earlier studies explored the features of online forums, such as their spatial and temporal aspects (Beeghly, 2005; Gao, 2011). Anonymity and asynchronicity present unique opportunities and pitfalls. Gao et al., (2011; 2013; 2017) have explored alternatives to traditional threaded discussion forums, like social annotation tools linking comments to specific text moments. These prior studies have made it possible now to examine how other types of online discussion forums might help or hinder uptake of peer contributions and other features of dialogic discussions that can contribute to collaborative and effective learning (Wegerif & Mercer, 1997; Wegerif, 2019).

Accordingly, this study addressed the following research questions:

- What are the affordances for dialogic discussions of two alternative discussion forums?
- How does the design of each forum influence uptake, dialogic spells, and discussion purpose?

We probe these questions through qualitative research on two new types of online forums. We involved 73 graduate students in 18 small-group online discussions for a library sciences course.

The common focus was Frank Stockton's short story, "The Lady, or the Tiger?" Instead of traditional threaded discussions, some groups used a linear chat forum, akin to SMS; others tried a Collaborative Responsive Writing forum (or CREW). We explored how participants interacted, attending to their uptake of others' contributions, as well as how the forum design shaped their interactions/ideas.

Literature Review

Authentic Dialogue and Dialogic Discussions

Prior studies of online discussions have often attended to individual contributions—to instructor moves (Beaudin, 1999; Rovai, 2007) and to the nature and quality of student posts—for example, connecting cognitive engagement in discussion to student emotions (Liu et al., 2022b) or to student roles (Liu et al., 2022a). In contrast, some studies have examined the relationship among discussion posts to redefine productive discussions in more contextualized, intersubjective terms (Arvaja & Hämäläinen, 2021).

Dialogism is an “intersubjective” theory often used in studies of Computer Supported Collaborative Learning (CSCL) (e.g., Stahl & Hakkarainen, 2021). Drawing on Bakhtin’s theory of dialogism (1981, 1986), this theory posits that, in academic and public discourse, effective conversations depend not only on the quality of individual contributions, but on how participants respond, interpret, challenge, and build on ideas, often using shared terminologies and technologies (Alexander, 2006; Parker, 2010; Wegerif, 2019; Sherry, 2021).

National US and UK studies of "dialogic discussions" have identified discourse features that facilitate such engagements (Applebee et al., 2003; Cambridge Primary Review Trust, 2017; Nystrand et al., 1997; Wegerif, 2013). Teachers can foster dialogic discussions by asking

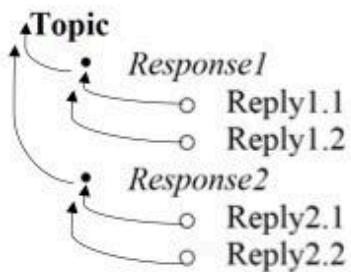
open-ended, higher-order thinking (O-HOT) questions (Nystrand et al., 2003; Sherry, 2017) and encouraging students to build on previous contributions (Collins, 1982; Nystrand, 1997). This uptake can create "dialogic spells" that deepen shared inquiries (Juzwik et al., 2008; Nystrand et al., 2003). CSCL researchers have found that computer-facilitated group deliberation toward consensus can also improve uptake (e.g., Wegerif, 2006; Felton et al., 2019). Yet, how to stimulate dialogic discussions in online academic forums remains an open research question (Grossen & Muller-Mirza, 2019; Sherry, 2020).

Challenges of Threaded Forums in Authentic Online Dialogue

Academic online discussions often use threaded forums (see Figure 1), where responses create separate “threads.” These structures can be hard to follow and can hinder students from uptake of prior ideas (Gao, 2011; Sherry, 2017). As arrows in Figure 1 suggest, typically each forum post relates only to the immediately preceding response, creating disjointed conversations (Hewitt, 2005; Sun & Gao, 2017).

Figure 1

A Model of Threaded Discussion



The design of these forums can unravel dialogic discussions, leaving questions unanswered or ideas unaddressed—creating what we call "tangles" (Sherry, 2017, 2021). Opportunities remain to explore how forum design can better support authentic online dialogue.

Alternatives to Threaded Online Forums

Given these limitations, some researchers have investigated alternative platforms like anchored discussions (see Figure 2) and webbed discussions (Gao, 2011; Ravenscroft & Matheson, 2002; Scardamalia, 2004; Sherry, 2017; Sun & Gao, 2017). Anchored discussions connecting posts to specific parts of a text, image, or video can enhance coherence among students' contributions (Sherry, 2017; Sun & Gao, 2017). However, anchored forums also spread posts across a course text, resulting in fewer replies (Sun & Gao, 2017). Webbed discussions (see Figure 3) allow for multiple links between posts, mitigating the issues of thread separation in traditional forums (Gao, 2011; Scardamalia, 2004; Sherry, 2017). However, following links may limit overall comprehensibility of the discussion flow.

Figure 2

A Model of Anchored Discussion

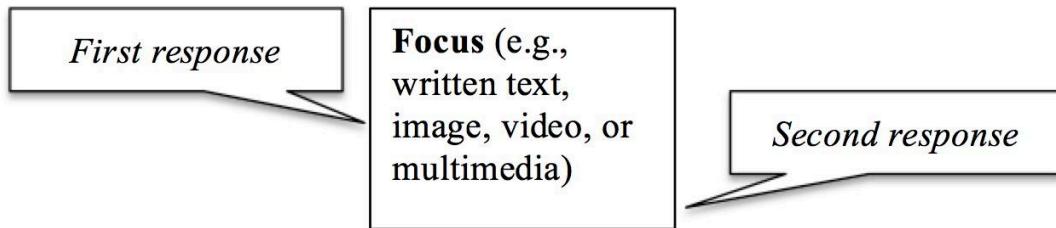
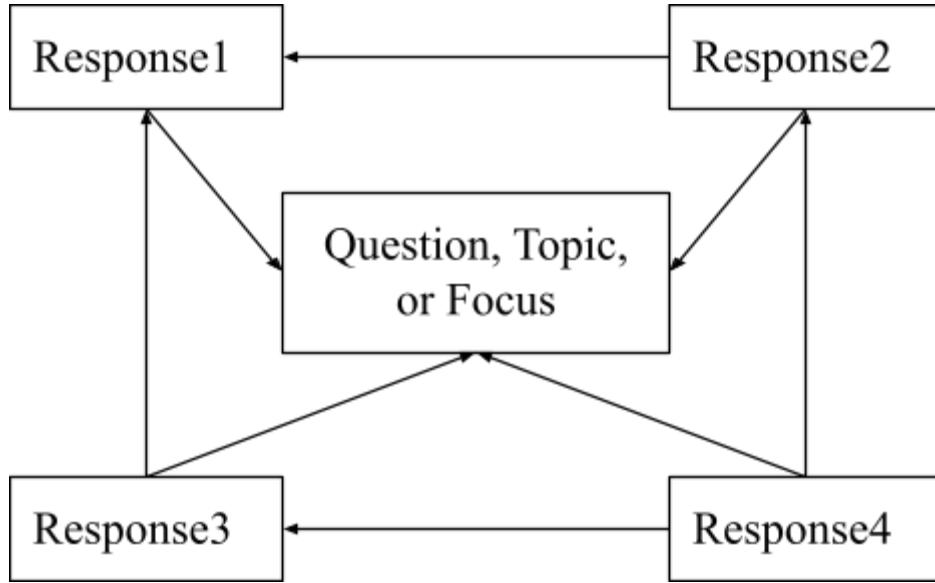


Figure 3

A Model of Webbed Discussion



These new forum types offer intriguing possibilities, but their designs might serve different discussion purposes. For instance, some forums might elicit more *social/procedural* discussions (e.g., “what’s up?” and “how does this work?”), while others may encourage *interpretation* of a shared focus (“what does this mean?”) or *deliberation* on group action (“what should we do?”). Moreover, students might *pivot* among these purposes, even within the same discussion. Thus, research might focus on how forum designs’ implicit purposes may also support or inhibit authentic, dialogic discussions (Parker, 2001; Sherry, 2017). In short, the structure of each type of online discussion forum can provide both affordances and limitations: threaded, anchored, and web discussions may limit dialogue because of structure and implicit purpose. Therefore, we designed two new types of forums to explore how they might foster dialogic discussions, particularly for interpretation or deliberation.

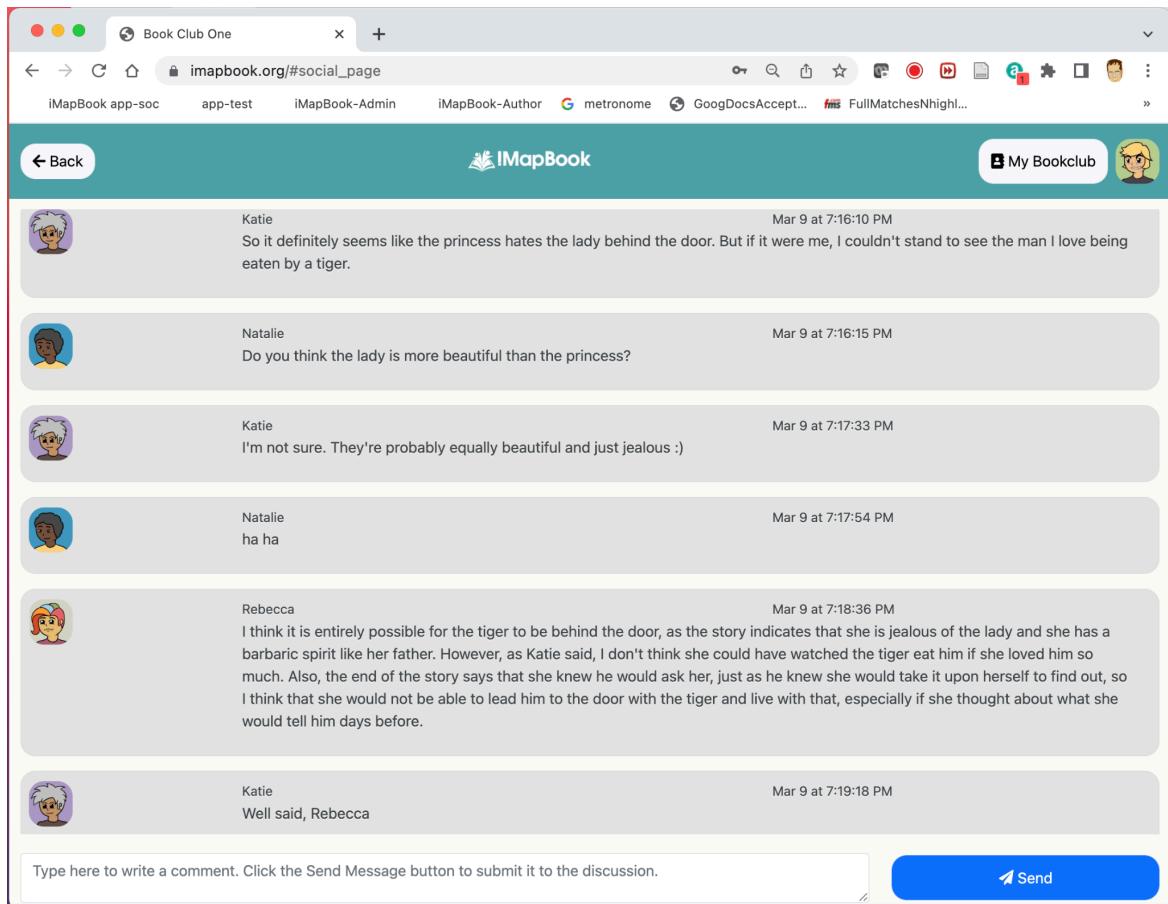
Designing Two Types of Alternative Forums

We explored the potential for dialogic discourse in two alternative types of online discussion forums, designed by Author1, with attention to how the design of those types might

shape students' participation. One type of forum, linear chat, is similar to forums used for instant messaging on Facebook (see Figure 4, below).

Figure 4

Interface for Linear Chat Discussion Forum



In the linear chat forum, each participant can make a post at any time. We chose to focus on this type of forum because posts appear in a single, linear, chronological chain, with the most recent at the bottom. As Sun and Gao (2017) noted in designing an alternative to typical discussion, participants in threaded forums “may find it hard to see connections or make new connections” (p. 44). Accordingly, we adopted linear chat because it makes all posts visible to all participants, encouraging connections across posts.

The second type of forum we call Collaborative Responsive Writing (CREW). Figure 5 shows the CREW interface, with discussion in the right window and a collaborative writing space at the left. The collaborative writing space works similarly to Google Docs, enabling multiple participants to type/edit at the same time. CREW participants can thus negotiate a response to an instructor question in the right window while simultaneously writing a collaborative response at the left.

Figure 5

Interface for CREW Discussion Forum

The screenshot shows a web browser window titled "Book Club One" with the URL "imapbook.org/#social_page". The page is titled "IMapBook" and features a "My Bookclub" button with a user icon. On the left, there's a collaborative writing area containing a prompt and numbered steps. On the right, there's a threaded discussion with five messages from users Caitlin N., Jennifer, and another user whose profile picture is not visible. A text input field at the bottom right allows for new comments, with a "Send" button next to it.

Part 1: What happens next? What is behind the door, the lady or the tiger? Part 2: Later, the King discovers that his daughter has broken the law. How does the King respond? What happens? Use the area below to collaboratively write a response to the prompt. Teammates can coordinate to write & edit here at the same time. Changes save automatically. When done, add the title SUBMITTED.

- 1 SUBMITTED
- 2 Part 1: The princess's eyes darted to the left as a smirk appeared upon her lips. He trusted her with his life in this moment and knew in his heart his love was true. She could not let him fall into the jaws of the tiger. The princess held her breath as her lover triumphantly opened the door and a hush came over the crowd. There was a brief moment as the lover opened the door of calm and anxiety in the colliseum, until the moment the tiger pounced upon the man. The tiger burst forth, snarling and clawing at the man who stood frozen in shock. The princess leapt from her seat to view the carnage as the king sat in shock that she had allowed the tiger to attack her love rather than be with another.
- 3 Part 2: The princess began to laugh hysterically as the king stared at her open-mouthed in horror. His daughter was a brute and sentenced her lover to death. The king realized the

Caitlin N. Mar 5 at 3:38:53 PM
It says to add the title submitted and that's it

Caitlin N. Mar 5 at 3:39:09 PM
Jennifer, I almost died lol

Jennifer Mar 5 at 3:39:53 PM
Great. It was so nice to work with a group where everyone participates. Thank you so much for being such a fantastic group to work with!!

Caitlin N. Mar 5 at 3:40:21 PM
Have a wonderful Saturday everyone!

Type here to write a comment. Click the Send Message button to submit it to the discussion.

We chose to focus on this type of forum because, like an anchored forum, the CREW forum invites discussion of a shared focus (collaborative writing). Moreover, like Felton et al.

(2019), we sought to provide opportunities for deliberation toward consensus, which can improve uptake. But unlike an anchored forum, which often centers a single, instructor-selected text, image, or problem, CREW's shared focus is generated by student-groups, rather than furnished to them, thereby inviting increased engagement.

Designing these two online discussion forums in relation to threaded discussions' drawbacks, and to the features of other, alternative forums, enabled us to address our research questions:

- What are the affordances for dialogic discussions of two alternative discussion forums?
- How does the design of each forum influence uptake, dialogic spells, and discussion purpose?

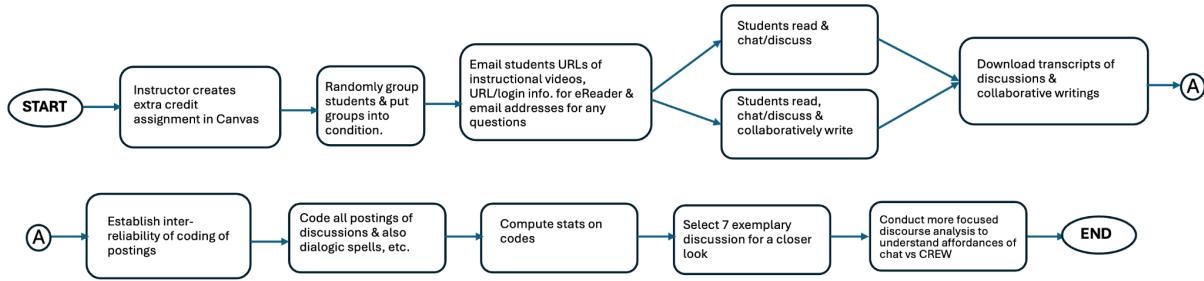
Methodology

In this section, we describe the research design of our mixed methods, discourse analytic study of discussions in two alternative types of online forums. Because this is primarily a qualitative discourse analysis, our goal was not to prove that one forum is better than another, or to survey students/instructors' preferences, but rather to explore how the design of each forum enabled and inhibited purposeful participation in different, highly contextualized ways.

Accordingly, our methodology reveals what is possible, rather than what is probable, offering generative (rather than generalizable) insights. We summarize our selection of site and participants, our data generation processes, and our data analysis procedures in Figure 6; more detailed explanations follow.

Figure 6

Flowchart of research processes



Participants/Site Selection

Participants were 73 graduate students from three sections of a course, Preparing Instructional Media, in the Library and Information Science Master's program at an R1 public university in the southeastern United States. All three sections were taught by the same instructor, who was not one of the authors. All courses in this Master's program use a Learning Management System (LMS) and web-based materials, with frequent use of the threaded discussions in the LMS. Participation in online discussions fit into the curriculum of the course, since school library supervisors (a target job for this Master's program), need to be aware of different online discussion platforms/designs. Therefore, all the discussions were part of course content/credit (approximately 5% of total course grade). Moreover, all students had extensive prior experiences with online discussions during coursework. Selecting students from the same graduate-level course, all of whom were experienced users of online discussions allowed us to focus less on the nature of the participants, or their skill at participating in online discussions, and more on how the design of each forum might support or constrain that participation.

Likewise, because moderating online discussions changes discussion behavior (Kwan et al., 2019), we chose to study unmoderated discussions, foregrounding the influence of the forum, rather than a teacher or group leader's facilitation.

Data Sources

We analyzed the discourse from all 18 conversations that occurred in two types of online discussion forums: (a) linear chat, and (b) CREW. We chose these two types of forums because of how they might encourage uptake, thanks to their differences from more widely used online discussion forum types that discourage dialogic discourse (see above). Both forums were embedded in web-based interactive e-books, designed by Author1. We used the IMapBook web-based interactive e-book system for this research because it is a flexible research tool for investigating individual and group interaction in the context of reading and responding to text. The e-book system has been used in six studies in five countries, United States, Netherlands, Slovenia, Saudi Arabia and China (Smith et al., 2019; Nielen et al., 2018; Drobisz, Park, & Smith, 2017; Smith, Haworth, & Žitnik, 2020; Smith, et al., 2013; Alsofyani, 2019). Since participants did not have prior experience with the interactive e-book system, we provided text and video introductions to the system. In short, we gathered data from two alternative types of discussion forums, both embedded in the e-book system, to facilitate our study of how different forum designs might contribute to differences in the discourse generated within these online forums.

Students in all discussions read a classic short story, “The Lady, or the Tiger?”, by Frank R. Stockton, first published in *The Century* magazine in 1882. This story is often anthologized for students because of its provocative, undetermined ending: a commoner engages in forbidden romance with the king’s daughter, and as punishment he must select one of two doors in the arena, from which will issue either a ferocious tiger or a comely lady (not the princess) whom he must marry. At the last moment, the commoner notices the princess nod her head almost imperceptibly towards one of the doors; the reader is asked to speculate what happens next.

Researchers chose this story because it is in the public domain, and they thought its non-deterministic ending would provoke discussions.

After reading the story, students addressed these prompts: “Part 1: Discuss what would happen next and why, providing evidence or logic. What is behind the door, The Lady, or the Tiger? Part 2: Later, the King discovers that his daughter had broken the law, by first finding out what was behind the doors & then signaling to her lover which door to open. What would the king do, and why?” Each student participated in only one of the two types of online discussion forums.

Data Analysis

We downloaded each conversation from the online discussion forums into a spreadsheet that enabled further analysis. For example, each turn (a post by one participant) appeared in a single cell of the spreadsheet. This allowed us to eliminate some conversations, selecting first for discussions that included at least three participants who each participated more than once, and whose posts related to the topic, as well as to other turns in the conversation (e.g., Nystrand, et al., 1997).

Coding for Dialogic Features

To a narrowed pool of 13 discussions, we applied extrinsic codes drawn from prior research on dialogic discussions (e.g., Nystrand et al., 1997; Sherry, 2021). To compute inter-rater reliability, we: a) developed a coding scheme and code book; (b) coded a discussion together; (c) coded three discussions independently, inserting codings in one Excel file, and (d) computed inter-rater reliability. Kappa was 0.942, an inter-rater reliability of 94%, considered excellent and sufficient for further analysis of data (McHugh, 2012). Although this is primarily a qualitative, discourse analytic study, we used this approach to mitigate bias: although Author1

designed the CREW and e-book systems used in our study, our goal was not to promote these systems, but to describe and evaluate the relationship between the forum design and the students' use of dialogic discourse features associated with authentic discussions.

We then coded the rest of the discussions. In the first round, we coded each post for whether it involved uptake, and what kind:

Table 1

Percentages of Uptake Type in Discussion Posts

Uptake Type	Total	Linear chat	CREW
Uptake	60%	54.3%	63%
Affirm	22.9%	16.8%	25.7%
Elaborate	17.5%	21.1%	15.9%
Disagree	1.6%	1.6%	1.7%
Filler	10.0%	8.9%	10.5%
Clarify	8.2%	5.8%	9.3%

These preliminary data suggested that both alternative forums encouraged students to engage with others' contributions, but CREW perhaps encouraged more uptake. However, other differences emerged related to discussion purposes, as underscored by our second-round coding, and ensuing qualitative analysis.

In the second round, we coded each post for discussion type (purpose). Table 2 shows percentages of discussion-post purposes across our dataset.

Table 2

Discussion-Post Purpose Percentages

Purpose	Definition	Example	Total %	Linear Chat %	CREW %
Interpretation	Posts about meanings of content. What did you think?	<i>Perhaps the ending means...</i>	54.8%	68.9%	48.7%
Deliberation	Posts about decisions to be made. What should we do?	<i>What should we write first?</i>	14.2%	0%	20.4%
Social	Posts to establish or maintain relationships. Who are we?	<i>Hello! I'm excited to work with you all.</i>	11.6%	16.3%	9.5%
Procedural	Posts about accomplishing a task. How does this work?	<i>What time is everyone available to meet and complete the task?</i>	7.5%	1.1%	10.5%
User Experience	User's opinion about the interface	<i>"I'm finding this program a bit slow and difficult to work in."</i>	7.7%	13.2	5.2%
Other	Not fitting in any category: typos, blank lines, etc.	<i>"aeeljd"</i>	4.1%	0.5%	5.7%

These data revealed different patterns for discussion-post purposes in linear chat and CREW

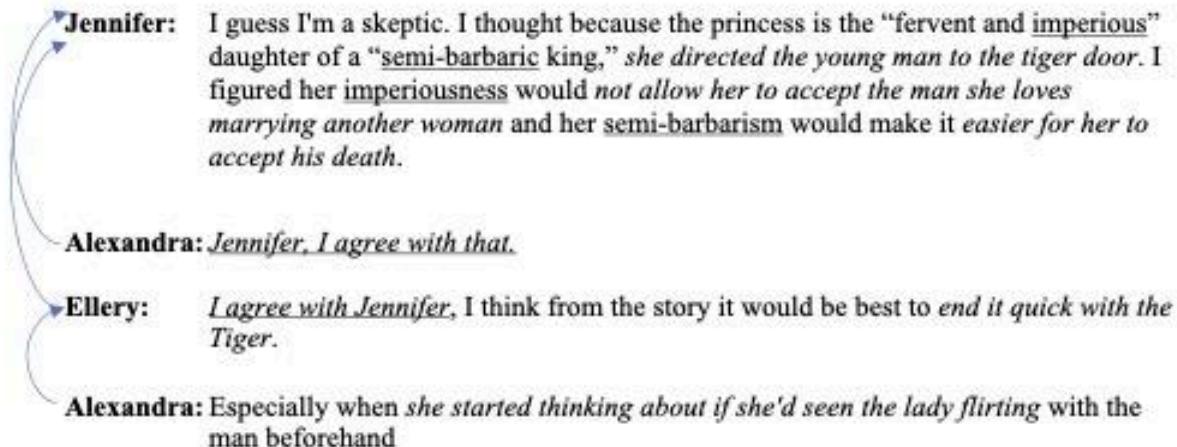
discussions. Interpretation posts, where users expressed their understanding of the content, were the most common (54.8%), followed by deliberation (14.2%) and social posts (11.6%).

Interestingly, deliberation posts, in which participants discussed decisions/action relative to content, were nonexistent in linear chat but made up 20.4% of CREW discussions. We return to this difference in our Results and Discussion/Implications.

In addition to coding for uptake and discussion-post purpose (e.g., interpretation, deliberation, social/procedural), we coded in a third round for the ratio of uptake to number of turns, and for dialogic spells (uptake among multiple speakers in succession). Because of their contingency on uptake among multiple speakers, dialogic spells are emergent (e.g., Juzwik et al., 2008; Sawyer, 2004). For instance, Figure 7 shows how similar phrases/ideas are repeated and developed across multiple conversational turns in a dialogic spell:

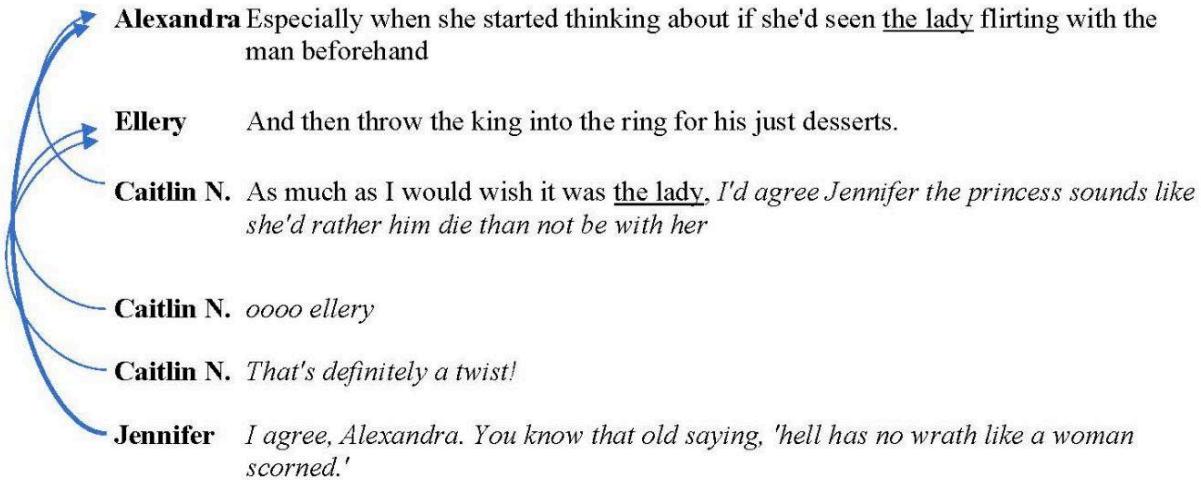
Figure 7

A Dialogic Spell



Note. Uptake of words is underlined; uptake of ideas is italicized; related turns are connected by arrows

During this coding, we also noted the presence of tangles: interruptions of what might otherwise have been an ongoing dialogic spell. For example, an authentic student question might go unanswered, or an intervening, unrelated post might interrupt a sequence of turns that included uptake. Such interruptions were not necessarily obstacles to dialogic discourse. Sometimes these tangles forced the conversation onto a different topic, while at other times, participants resolved a tangle and returned to the same line of inquiry, as in Figure 8.

Figure 8*A Tangle Interrupts a Dialogic Spell and is Resolved*

Note: Uptake of words is underlined; uptake of ideas is italicized; related turns are connected by arrows

Choosing Examples of Highly Dialogic Discussions

Based on our coding scheme, and on preliminary descriptive statistics, we focused on a dataset of seven highly dialogic discussions, characterized by a high ratio of uptake to number of turns and by long/frequent dialogic spells, despite tangles (see Table 3). Of these seven highly dialogic discussions, three appeared in the chat forum and four in CREW; additionally, four were synchronous, and three were asynchronous:

Table 3 *Coding for Selection of Highly Dialogic Discussions*

Type of Conversation	# of turns	Ratio of uptake to turns	# of dialogic spells: max length of dialogic spell:
1 - CREW/SYNC	60	0.80	2:29
2 - CREW/SYNC	93	0.82	7:22
3 - CREW/SYNC	83	0.62	6:18

4 - CREW/ASYNC	23	0.26	3:7
5 - CHAT/SYNC	99	0.66	9:18
6 - CHAT/ASYNC	30	0.63	2:4
7 - CHAT/ASYNC	17	0.32	1:16

We selected two exemplary discussions (2 and 5 bolded above in Table3), one from each forum type, to address in our qualitative findings. These two included the most turns, a comparably high ratio of uptake to turns, and a large number of lengthy dialogic spells. Though our qualitative findings center on two synchronous discussions for comparison's sake, we also refer to similarities and contrasts with the highly dialogic asynchronous discussions in each type.

Situating these two focal discussions in relation to quantitative trends and contrasting qualitative examples lends credibility to our findings.

Results

Quantitative

In this first section, we offer statistical analyses of discussion-post codings and our interpretations. We compared linear chat versus CREW discussion postings, in terms of: (a) uptake - whether there was uptake (yes or no) and the type of uptake; (b) types (purposes) of discussion posts (Figures 11 and 12), and (c) whether posts were part of a dialogic spell.

Figures 9 and 10 chart the types of uptake (inclusion of others' contributions in posts) in Chat and Crew discussions.

Figure 9

Uptake Categories in Chat Posts

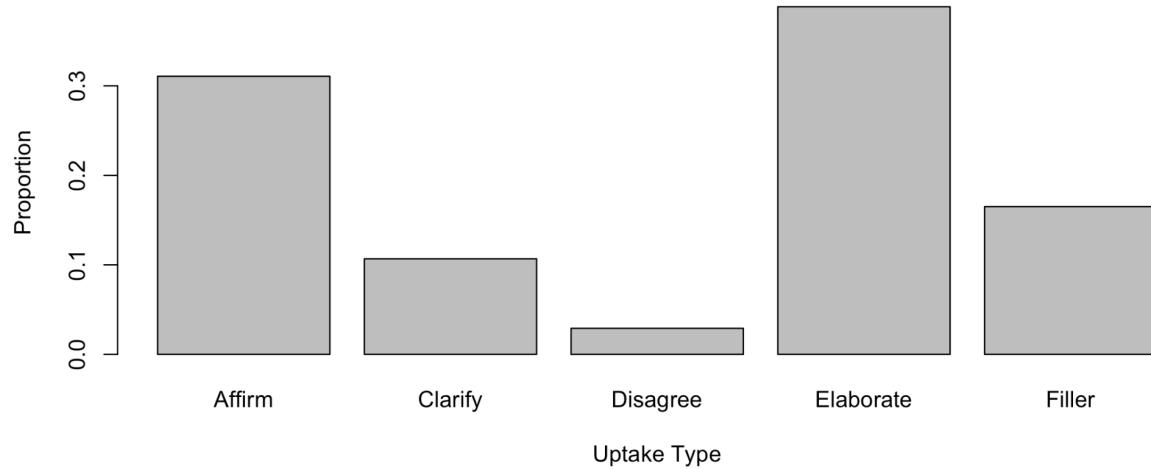
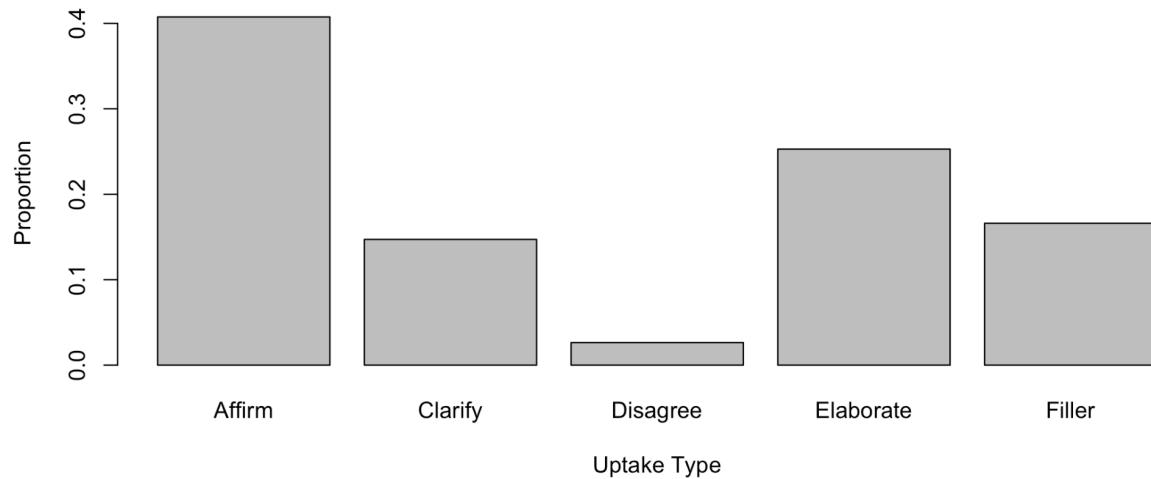


Figure 10

Uptake Categories in CREW Posts



The pattern of uptake types looks similar, but the amount of uptake was slightly different across the platforms (54% linear chat, and 63% CREW). A t-test of presence/absence of uptake in postings, comparing chat ($M = 0.54$, $SD = 0.5$) versus CREW ($M = 0.63$, $SD = 0.48$) discussions, was significant: $t(610) = 2.0$, $p = 0.45$, with a small effect size of .18. Further, there were differences in distribution of uptake types. A Chi-square test indicated significant

differences in the pattern of post types in uptake, between chat and CREW discussions: $X^2 (5, N=611) = 11.2$, $p = .048$, a small effect size of 0.13. These differences, shown in Figures 9 and 10, suggest that CREW encouraged more uptake, particularly affirming and clarifying, while Chat uptake was more likely to elaborate other posts.

Figure 11

Types (Purposes) of Discussion in Chat Posts

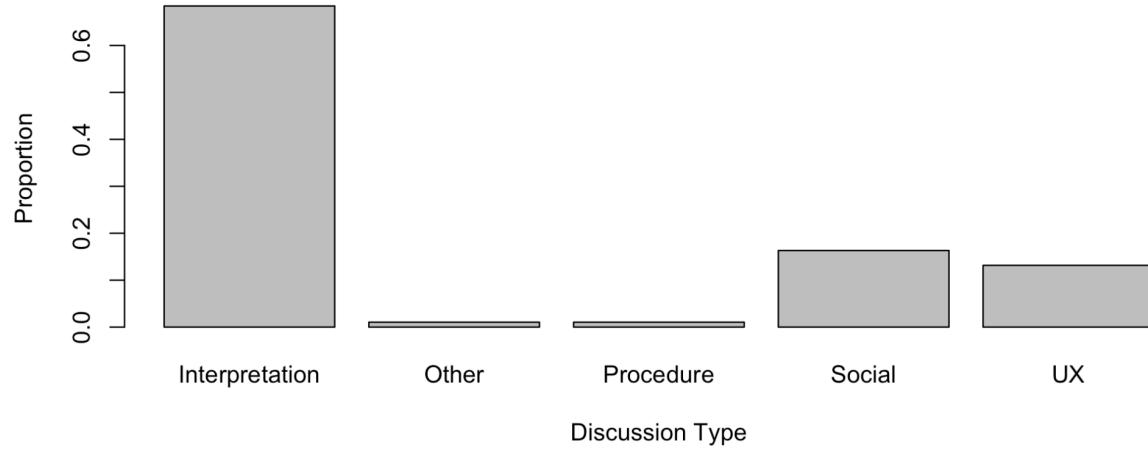
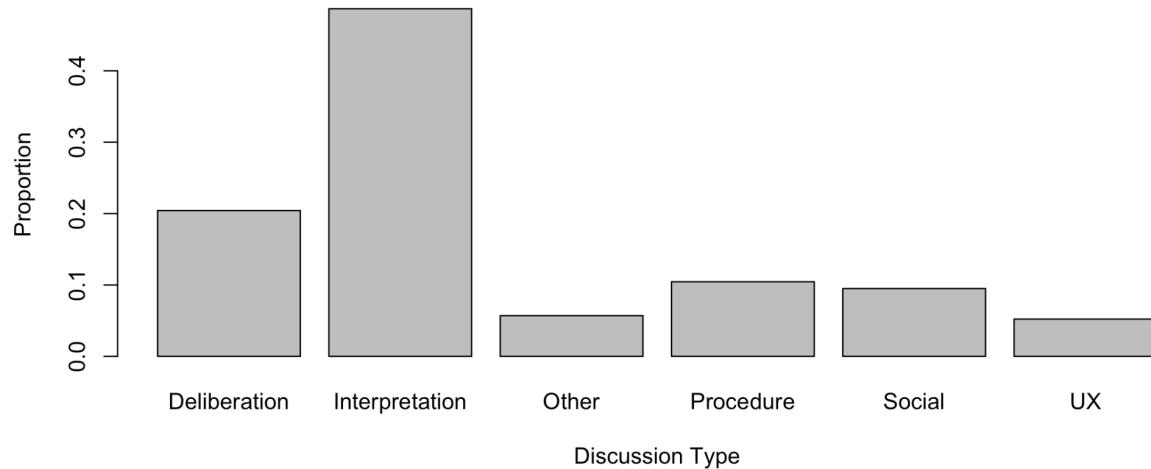


Figure 12

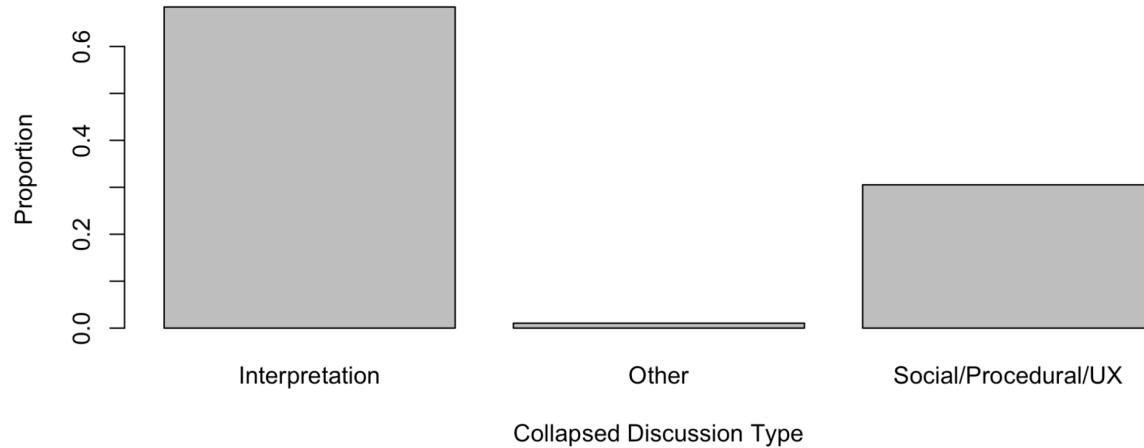
Types (Purposes) of Discussion in CREW Posts



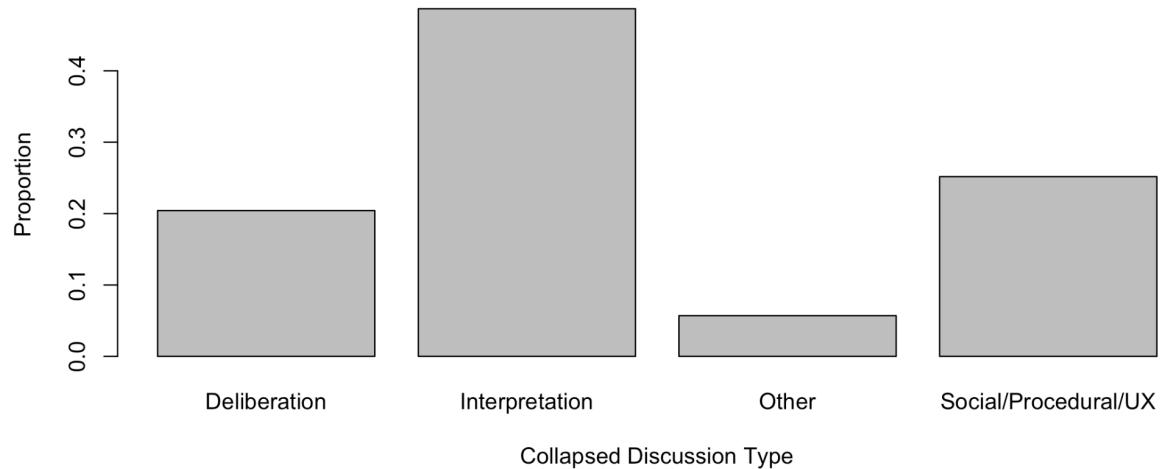
As Figures 11 and 12 show, the types (purposes) of discussion differed between Chat and CREW forums. A Chi-square test indicated significant differences in the distributions of postings types, between chat and CREW discussions: $X^2 (5, N=611) = 85.6, p = .001$, with a medium effect size of 0.37. To make differences clearer, we collapsed Social, Procedural and UX discussion types into one category (see Figures 13-14 below). The Chi-squared test of distributions of these collapsed postings types, between chat and CREW discussions, are also significant: $X^2 (3, N = 611) = 55.7, p = .001$, with a medium effect size of 0.3.

Figure 13

Types (Purposes) of Discussion in Chat Posts (Collapsed)

**Figure 14**

Types (Purposes) of Discussion in CREW Posts (Collapsed)



These differences demonstrate that while both forums encouraged interpretation, CREW forums included deliberation, while chat forums did not. This significant difference likely pertains to the design of the CREW forum, which requires deliberation on procedural and rhetorical decisions related to collaborative writing. Moreover, while both forums encouraged dialogic spells (chains of related uptake), Chat and CREW forums also differed in this regard: A t-test of whether each posting was part of a dialogic spell, comparing chat ($M = 0.54$, $SD = 0.5$) versus CREW ($M =$

0.88, SD = 0.35) discussion, was significant: $t(610) = 203.5$, $p = 0.001$, with a large effect size of .86. These findings may be related. Felton et al., (2019) found that deliberative dialogue can improve uptake. More deliberative discussion, thanks to the CREW forum design, may have produced more dialogic spells. We return to this point in our qualitative analysis and in our Discussion.

Qualitative

This section describes our analysis of two highly dialogic discussions from the linear chat and CREW discussion forums, observing how each platform influenced students' purposive, dialogic interactions. This evaluative comparison did not rank forum designs. Instead, within these two exemplars, we explored how forum design affected student uptake and dialogic spells. We examined interruptions, or tangles, noting their occurrence and participant responses. We also inspected shifts, or pivots, in discussion purposes from social negotiation to interpretive debate or group deliberation, relating these pivots to dialogic discourse quality.

Linear Chat Discussion Forum

In the example below from a synchronous linear chat forum, three students read “The Lady, or the Tiger,” and addressed two prompts. After brief greetings and a chat about browser issues, the students discussed their story interpretations:

Figure 15

Natalie, Kate, and Rebecca's Synchronous Chat Discussion

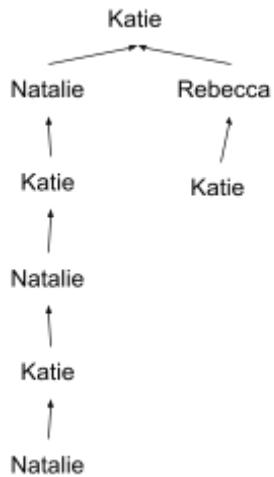
- 
- Katie:** So regarding part 1 of the question, I think the lady is behind the door!
- Natalie:** Okay, I agree, I think the lady is behind the door.
- Katie:** So it definitely seems like the princess hates the lady behind the door. But if it were me, I couldn't stand to *see the man I love being eaten by a tiger*.
- Natalie:** Do you think the lady is more beautiful than the princess?
- Katie:** I'm not sure, I think they're probably equally beautiful, and just jealous. :)
- Natalie:** Ha ha
- Rebecca:** I think it is entirely possible for the tiger to be behind the door, as the story indicates that she is jealous of the lady and she has a barbaric spirit like her father. However, *as Katie said, I don't think she could have watched the tiger eat him if she loved him so much*. Also, the end of the story says that she knew he would ask her, just as he knew she would take it upon herself to find out, so I think that she would not be able to lead him to the door with the tiger and live with that, especially if she thought about what she would tell him days before.
- Katie:** Well said, Rebecca

In this excerpt, three students responded to the first prompts (underlining signifies repeated words, italics show recurring ideas). Transcription conventions demonstrate student uptake, with participants citing and paraphrasing each other to address varied, but linked, viewpoints on the princess's jealousy. Their posts posed questions ("do you think the lady is more beautiful than the princess?"), prompting further discussion and a nine-turn dialogic spell. While increased uptake could be due to synchronous discussion, the linear chat forum's asynchronous discussion also showed high uptake-to-turns ratios (including one at 0.66) among our seven highly dialogic discussions. The extensive uptake seems connected to the intertwining of various conversational strands.

In a regular threaded discussion forum, the exchange above could have occurred in parallel threads. In the linear chat, different threads overlapped. In a threaded forum, two responses to Katie's reposed Part 1 prompt could have been separated, making subsequent exchanges invisible to the other participant. Natalie and Katie might have discussed the lady's beauty, while Rebecca proposed the tiger interpretation, as in Figure 16.

Figure 16

Natalie, Katie, and Rebecca's Exchange in a Hypothetical Threaded Forum

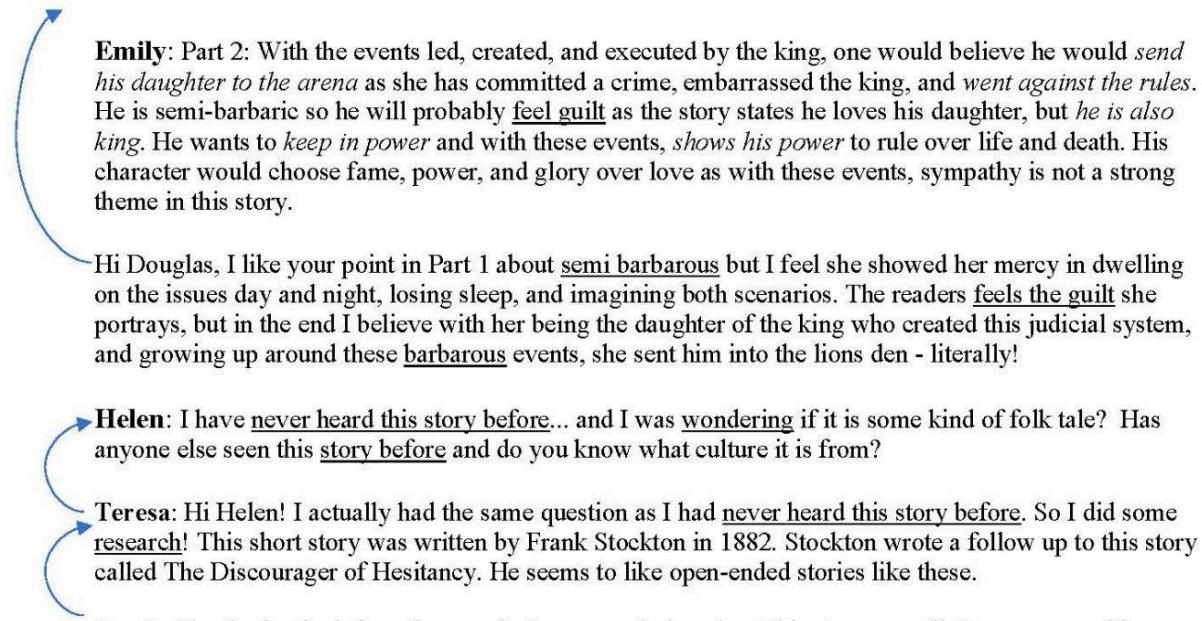


Instead, a dialogic spell emerged: both Natalie and Rebecca responded to Katie's initial post. Although Rebecca's final input didn't address Natalie's question about the lady's beauty, it involved uptake of subsequent exchanges on the princess's jealousy. This linear chat discussion, lasting 99 turns, maintained a high uptake-to-turns ratio (0.66). Importantly, uptake often led to dialogic spells - continuous, multi-turn uptake. The above example was one of nine dialogic spells in this discussion, the longest spanning 18 turns (see Table 1). As illustrated, the forum's overlapping threads seemed to foster more, longer dialogic spells. Thus, the linear chat forum, by removing thread isolation, interwove responses in a way that fostered highly dialogic discourse.

Another highly dialogic (asynchronous) linear chat discussion displayed similarly interwoven threads. However, unlike the first example, this intertwining caused interruptions, or tangles:

Figure 17

Contrasting Asynchronous Chat Discussion



In part one I think he chose the princess because of her hints. In part two she *broke the rules* so the king must be *true to his role as leader* and must trust fate and *deal with his daughter* how he would anyone else.

In this excerpt, Emily addressed the prompt by labeling “Part 2”. She replied to Douglas's comment on the princess's “semi-barbarous” nature. Douglas didn't respond, and Emily's engagement didn't lead to dialogic interaction. Instead, Helen, Teresa, and Sarah discussed the story's origins. This exchange was interrupted by a tangle created by Sarah, who replied to Teresa and posted another response. Participants pivoted between fulfilling prompts and interpreting others' posts, contributing to tangles. This asynchronous chat discussion had a high uptake-to-turns ratio (0.63), yet most were pairs (“Hi Helen!”) and only two became dialogic

spells. Previous research has labeled such unsuccessful attempts to create dialogic discussions as “sputter” (Freedman, 2020).

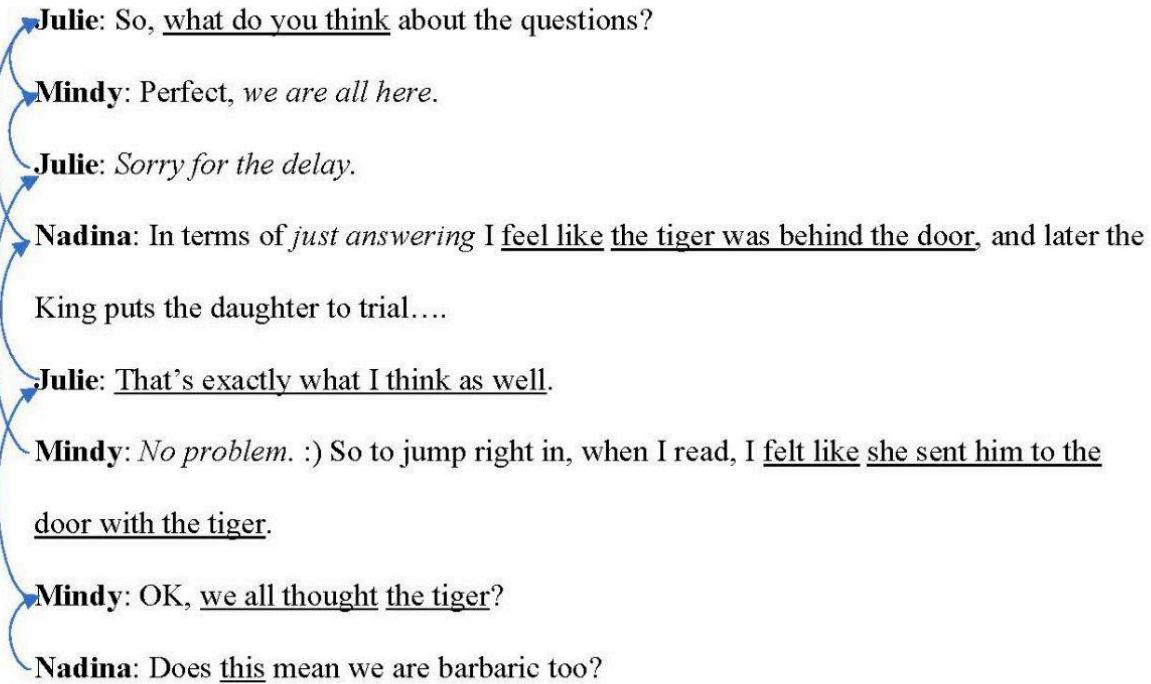
These excerpts highlight a pattern in linear chat forum discussions. Overlapping conversations, which could have appeared as parallel threads, encouraged uptake. Although the forum eliminated thread hierarchy, tangled responses sometimes blocked dialogic spells. Our dataset had 15 such tangles in linear chat discussions; participants resolved five. Unresolved tangles often resulted from participants pivoting from group interpretation to individual assignment (e.g, “For Part 1, I thought...”), creating a physical gap between a new post and previous posts inviting responses. Tangles disrupted dialogic spells, even when resolved. Still, the forum made all posts visible for potential synthesis.

CREW Discussion Forum

CREW students responded to the same story and prompt. They also co-authored a response in a writing window beside the forum. CREW posts initially resembled those in the linear chat forum:

Figure 18

Julie, Mindy, and Nadina’s Synchronous CREW Discussion



Julie’s post invited story interpretation. As underlined words show, all participants responded with their interpretations (“I feel,” “I felt,” “I think”). Yet Mindy’s post (“perfect, we are all here”) suggested she remained in procedural talk. Italicized words show this procedural thread’s uptake: Julie reverted to procedural talk, apologizing for lateness. Simultaneously, Nadina answered Julie’s question. These divergent responses created a tangle, with Mindy following up on Julie’s apology and attempting to “jump right in” to the assignment, despite her partners already doing so. However, participants swiftly identified overlapping interpretations, pivoting towards collaborative synthesis (“we all thought”).

As they continued discussing answers to prompts and story interpretations, a similar response pattern emerged:

Figure 19

CREW Discussion Tangle and Resolution



Nadina: Does this mean we are barbaric too?

Mindy: Ha ha, maybe!

Mindy: So if the King puts *his daughter* on trial, does that mean he sets her up with 2 doors as well?

Julie: lol no, it just seemed like what happened based on *her father*, and her own jealous nature.

Mindy: Yes, she did seem very jealous. The story led me to believe she would rather have him if she could not.

Nadina: from my thoughts I thought yes, he sets up 2 doors for her and lets the trial decide.

Julie: I think so. Even though the story said he loved her so much, I think his barbaric nature would take over his reasoning.

Mindy: OK, so what happens then? Do we choose which door she opens?

Here, too, Julie's response to Nadina's question ("lol no") came after Mindy's question, creating a tangle. However, participants swiftly recovered, addressing Mindy's query about the King imposing a similar choice on his daughter. This allowed them to pivot from shared interpretations to collaborative composing.

The CREW forum invited both interpretation and deliberation, often separate activities in traditional classrooms (e.g., Parker, 2001). Deliberation marked Mindy's and Julie's final questions. Authentic questions and uptake from all three participants increased dialogic interaction. Despite format-induced interruptions, participants maintained dialogue, transitioning from interpretive discussion to collaborative writing. Similar patterns appeared across our dataset, with tangles abutting student questions and pivots. These tangles were common in both forums, but 10 of 15 in the chat forums remained unresolved, compared to just one in the CREW forum.

The exception was an asynchronous CREW discussion with participants struggling to grasp the interface and assignment:

Figure 20

Contrasting Asynchronous CREW Discussion

Adam: If any of us were on at the same time, we would be able to prepare a collaborative response in the *window to the left*. However, I do not think it is mandatory.

Shannon: I thought it meant, we should respond individually, then come together to create a collaborative response, which we will *submit to the left*?

I can look through our responses, *create a response here on the right*, then you all can approve it or edit what you think we should submit. Thoughts?

Ok, now I see what we are getting at. I thought we had to *save it on the left*. I see now that it stays there for people to add and edit.

Caitlin: Part 1: I assumed that the tiger would be behind the door. The princess is framed as someone who is as barbaric as her father, and she loses her love either way. She may be of the opinion that if she can't have him, then it's better for him to die and not to see him happy with another.

Shannon's effort to foster deliberation ("you all can approve it or edit what you think we should submit. Thoughts?") was tangled by her reflection on the interface and Caitlin's independent interpretation. Other attempts to transition from interpretation-sharing to collaborative writing also failed. Eventually, participants posted individual answers in the shared writing space. Despite including replies to others' interpretations, this discussion had a lower uptake-to-turns ratio (0.26), yielding only three brief dialogic spells. The discussion sputtered without the required collective response.

In contrast, Julie, Mindy, and Nadina from the previous CREW exemplar deliberated extensively on content and wording of their responses to prompts.

Figure 21

CREW Deliberation About Collaborative Writing

Nadina: Is the second sentence for Part 2 okay?

Julie: Should we mention that love didn't weigh in to either of *their* decisions?

Mindy: I like it. It draws from the story.

Nadina: Probably yes

Mindy: Good idea.

Julie: I'm not sure how to word it, but I think *their* barbaric nature made them *irrational* and maybe *incapable* of love? Something like that...

Nadina: I mean I think it states that the *king* does love the *daughter* at some point though.

Nadina: Maybe not to enough of a degree not to put her to trial...but *he* does love *her*, just like to a degree *she* loved the man

Mindy: Maybe write that the *king*, despite his love for his *daughter*, could only act in a barbaric manner.

Mindy: *He* was tied to *his* own *idealistic principles*?

Here, participants debated their second-prompt answer, imagining the king's reaction to his daughter's transgression. Despite a tangle over the second post, all three took up "love" and debated whether and how the king loved his daughter, scrutinizing the term "barbaric." Responses had words signaling uptake, like "it," and deliberation regarding language choice. This dialogic spell--the fifth in this discussion--lasted 18 turns. Moreover, the shared written response incorporated each member's inputs:

SUBMITTED Part 1: He opens the door to find the tiger. The king's daughter could not bear the idea of sharing him with anybody else and so sent him to his doom. Her jealousy and barbaric nature blinded her from reason and love did not prevail. Part 2: The king, upon discovering his daughter has broken the law, puts her on trial. He does this not only

because of his semi-barbaric nature, but also because of his idealistic views that the trial will provide a fair ruling. Despite his love for his daughter, the king's barbaric nature and idealistic principles overruled his heart.

(The written ending) From the door emerged the tiger. The man turned back to the lady and as the tiger pounced and tore the man's limbs from his body, the man's eyes looked pleadingly at the lady, wondering why she chose to show him the door that led to his death. After all her imagining, the Princess was numb to the grotesque display of violence before her. While on previous occasions when the person on trial would open the door to the tiger, the Princess would look away after a few moments, now she simply looked on as her lover was butchered. . . . the King learned of his daughter's bribery to find out which door the tiger would be behind. As much as it pained him to learn of his daughter's infraction, having his semi-barbaric idealism the King knew of only one way to respond. He had to put his daughter to trial.

. . . . The crowds were gathered and when the door opened to allow the Princess into the arena the audience was in an uproar. The Princess looked back at her father, hoping he would give her some clue as to which door to open, an action of self-concern and survival, not wanting to die herself, despite knowing if he told her which door to open, he would be committing the same crime she did. She turned back around to face the doors, and with anticipation and hope opened the right door.

This collaborative submission mentioned the king's "barbaric nature" and "idealistic principles" that, "despite his love for his daughter," would "overrule his heart." Thus, it included story ideas and phrases that participants had debated earlier in the discussion, not only during a dialogic spell about their interpretations, but also during deliberation over their collaborative composing.

Additionally, their procedural discussion of whether and how to write an ending, prompted by Part 2 of the assignment, resulted in a substantial continuation of the story. This ending was striking in that it not only took up content and style from the original story, but also captured tensions participants had discussed: Would the princess choose the “right” door, or simply the one on “the right”? Would the king “love” his daughter enough to save her? And if the choice was left up to readers (as in the original story), would that mean that “we are barbaric, too”? Like other CREW forum discussions, this one culminated in a collaborative response that was also dialogic, weaving together threads of the preceding procedural, interpretive, and deliberative conversations, as well as evidence from the assigned text.

Like the linear chat, the CREW forum eliminated the hierarchy of separate threads and subordinate replies, but that interweaving likewise increased interruptions. However, CREW participants mostly addressed these tangles and remained in dialogue, pivoting from procedure, to interpretation, to composition. Across 93 posts in the focal synchronous CREW discussion above, participants asked 25 authentic questions, engaging in seven dialogic spells. While this volume and consistency of dialogic discourse did not appear in asynchronous CREW discussions, and thus might be attributed to that forum-feature, our findings also contrast with prior research on synchronous discussions in face-to-face classrooms where dialogic discussion has remained relatively rare (Applebee et al., 2003; Cambridge Primary Review Trust, 2017; Nystrand et al., 1997). Alternatively, dialogic discourse in the CREW forum pertained to the design of the forum itself, which invites participants to write collaboratively, provoking discussion of how to accomplish the task, how to reach consensus, and how to compose a response. We address these trends further in the next section.

Discussion/Implications

Using both quantitative and qualitative analyses, we examined how the design of two alternative types of online discussion forums—linear chat and CREW—supported and limited student dialogue, attending to features like uptake, dialogic spells, and discussion purpose. Our quantitative analysis showed significant differences between Chat and Crew discussions with regard to types of uptake, discussion purpose, and presence of dialogic spells (chains of related posts). From a dataset of seven highly dialogic discussions, including both synchronous and asynchronous, we selected two synchronous exemplars (one from each forum type), supplementing our qualitative findings with examples from the other discussions.

Previous research addressed benefits and challenges of threaded discussion forums, which require participants to read separate threads to find replies to their posts (Hewitt, 2001; Sherry, 2017; 2021). Threaded online discussions may discourage struggling readers, but may encourage participation from less outspoken students, allowing more time to respond thoughtfully without the interruptions in face-to-face classrooms (Beeghly, 2005; Larson & Keiper, 2002). We extended this research, suggesting that alternative types of online discussion forums may encourage more dialogic discussions by eliminating the hierarchy of posts/replies in threaded forums. However, such alternate forums may also constrain dialogic discourse in other ways.

Linear Chat: Combining Threads Can Lead to Dialogic Spells...and Tangles

Quantitative analysis revealed that linear chat can encourage uptake, particularly elaboration of others' ideas. Indeed, the focal synchronous linear chat discussion lasted for 99 turns with a high ratio of uptake to turns (0.66); this discussion produced nine dialogic spells, including one that lasted 18 turns. Dialogic spells occurred in this highly dialogic discussion

when responses that, in a threaded forum might have appeared in separate threads, instead overlapped. Prior research on online discussions found that threaded discussion forums can deter dialogue that extends across multiple, related posts (Hewitt, 2001; Sherry, 2017; Sun & Gao, 2017). A linear chat forum, by eliminating the isolating hierarchy of separate threads, can encourage uptake of previous contributions, producing dialogic spells, as students reference multiple, prior posts in one response. Practitioners may opt for linear chat forums to encourage dialogic spells. However, linear chat forums do not always produce continuous uptake. Although the asynchronous linear chat discussions also had high ratios of uptake to turns (including one in our dataset, at 0.63), these conversations had fewer dialogic spells. In these asynchronous linear chat discussions, student questions and replies that might have been dialogic spells were interrupted by tangles. This qualitative comparison may explain the statistically significant differences between Chat and CREW regarding dialogic spells.

For example, when students pivoted from fulfilling the assignment prompts to posing questions or replying to others' interpretations, the interspersal of these two response-purposes forestalled dialogic spells, limiting uptake to pairs of posts and responses. Prior research on face-to-face discussions termed such abortive attempts at dialogic discussion "sputter" (e.g., Freedman, 2020). While sputters/tangles in face-to-face conversations have been attributed to lack of preparation, we suggest conflicting purposes (e.g., demonstrating competence to the teacher vs. co-elaborating interpretations with peers) may also create tangles. Online instructors might avoid this by aligning assignments with dialogic principles: posing authentic questions that invite multiple interpretations and requiring uptake of others' ideas.

Prior research has suggested that in threaded online forums, the structure of the forum itself limits discussion to pair or dyadic dialogue (Gao, 2011; Sherry, 2017). Our own prior

experience with online discussions suggests that this pattern (make a post, then reply to one or more other respondents without expectation of further dialogue) may stem from “genre contact” (Bakhtin, 1984): students import a familiar practice (e.g., post, then respond to two peers) across different types of discussion forums, regardless of design. Teachers may need to show new possibilities of an alternative forum’s design to students, or add a new task.

CREW Forum: Shared Focus Can be Spell-binding

Quantitative analysis showed significant differences between chat and CREW related to types of uptake and discussion purpose. The CREW forum required collaborative writing, changing both forum design and purpose. Participants in the focal synchronous CREW discussion posed authentic questions, took up others’ contributions, and engaged in multiple dialogic spells. Their collaborative written response also reflected participants’ dialogic contributions. Previous studies show that, compared with threaded forums, anchored forums, inviting communal annotation of a text, can foster more focused posts and more uptake of the course text, as well as other students’ ideas (Gao, 2011; Gao et al., 2013). However, anchored forums distribute posts across a course text, potentially limiting replies (Sun & Gao, 2017). The design of the CREW forum, compared to other types, encouraged dialogic discussion by providing a shared focus, without anchoring posts to specific parts of a course text. Practitioners might consider CREW to incorporate shared focus into online discussions.

Prior research about face-to-face and online conversations, across disciplines, contrasts exploratory talk, where participants use dialogic uptake to reach consensus, with cumulative talk and disputational talk, where participants share perspectives and even disagree, without uptake (e.g., Mercer, 1995; Wegerif & Mercer, 1997). Indeed, Felton et al., (2019) found that deliberative argumentation toward consensus increased uptake in discussions. Likewise, CREW

forum discussions, because they required collaborative writing, encouraged participants to resolve tangles, while linear chat forums (like typical threaded forums) had no such shared focus or impetus to return to and synthesize prior posts. Online instructors might design discussion assignments that incorporate collaborative writing to encourage resolving tangles.

We do not claim that all CREW forum discussions result in uniform consistency of dialogic discourse. Indeed, one CREW discussion in our dataset, while still highly dialogic in its prevalent uptake, produced a low ratio of uptake to turns and only three short dialogic spells. Participants chose to submit a collection of separate interpretations, rather than a single collaborative response. Rather than serving as a counter-example, this exception also seemed to suggest that deliberation toward consensus—or at least toward a shared collaborative task—can promote dialogic discourse (by demonstrating that deliberation’s absence can discourage dialogue) when built into the design of online discussions.

Tangles in both forums blocked dialogic spells and were resolved more often in the CREW forum, as participants worked towards collaborative composition. However, we do not suggest that dialogic spells are always good, or tangles inherently undesirable. Prior studies have proposed that dialogic discussions in face-to-face contexts can depend on cultural communication practices (e.g., Brindley et al., 2016; Hirst & Renshaw, 2004), including, for example, how participants disagree (Sherry, 2014). In such cases, measured and coherent turn-taking is not necessarily superior to overlapping and interrupted strands of talk. Indeed, researchers of critical digital literacies observe that online discussion forums can support or limit participation in ways related to race, class, and other cultural discourses (e.g., Monea et al., 2022; Nichols & Stornaiuolo, 2019). Whereas dialogic spells in the examples we shared seemed to support students in debating and developing ideas, such chains of related posts in another context

might signal that one line of inquiry dominated, at the expense of other perspectives. Similarly, while tangles in our analysis seemed to disrupt students' collaborative interpretation, such interruptions also offered multiple perspectives. Further research is needed on how the presence of dialogic spells and tangles relates to equity and cultural communication practices in online discussions. Practitioners might attend to whether and how alternative discussion forums encourage the emergence and development of different perspectives.

Conclusion

In this article, we have suggested that alternative designs for online discussion forums can produce highly dialogic discussions in which participants share and refine different interpretations and deliberate to produce collaborative writing. Both linear chat and CREW discussions produced a high uptake-to-turn ratio, but tangles that blocked dialogic spells were more likely to be resolved in CREW discussions, which showed significant differences related to deliberation as a discussion purpose. At a time when speakers in the public sphere often talk past each other, we find it heartening that changes in the design of online discussion forums might promote and sustain dialogic discourse, including deliberation toward consensus and the resolution of misunderstandings. We call for further research on how innovative alternatives to traditional online forum designs might support authentic dialogue.

References

- Alexander, R. J. (2006). *Towards dialogic teaching: Rethinking classroom talk* (3rd ed.). Dialogos.
- Applebee, A. N., Langer, J. A., Nystrand, M., & Gamoran, A. (2003). Discussion-based approaches to developing understanding: Classroom instruction and student performance in middle and high school English. *American Educational Research Journal*, 40(3), 685–730.
- Alsofyani, A. (2019). *Examining EFL learners' reading comprehension: the impact of metacognitive strategies discussion and collaborative learning within multimedia E-book dialogic environments*, Unpublished degree type dissertation. University of South Florida.
- Arvaja, M., & Hämäläinen, R. (2021). Dialogicity in making sense of online collaborative interaction: A conceptual perspective. *Internet and Higher Education*, 48, 1–9.
- Bakhtin, M. (1981). *The dialogic imagination: Four essays* (M. Holquist, Trans.). University of Texas Press.
- Bakhtin, M. (1984). *Problems of Dostoevsky's poetics* (C. Emerson, Trans.). University of Minnesota Press.
- Bakhtin, M. (1986). *Speech genres and other late essays* (M. Holquist & C. Emerson, Trans.; Vol. 1st). University of Texas Press.
- Beaudin, B. P. (1999). Keeping online asynchronous discussions on topic. *Journal of Asynchronous Learning Networks*, 3(2), 41–53.
- Beeghly, D. G. (2005). It's about time: Using electronic literature discussion groups with adult learners. *Journal of Adolescent & Adult Literacy*, 49(1), 12–21.

- Brindley, S., Juzwik, M., & Whitehurst, A. (2016). Diversifying dialogic discourses: Introduction to a special issue on international perspectives on dialogic theory and practice. *L1-Educational Studies in Language and Literature*, 16, 1–10.
- Cambridge Primary Review Trust. (2017). *Dialogic teaching* (p. 77) [Evaluation report and executive summary]. Education Endowment Foundation.
- Collins, J. (1982). Discourse style, classroom interaction, and differential treatment. *Journal of Reading Behavior*, 14, 429–437.
- Felton, M., Crowell, A., Garcia-Mila, M., & Villarroel, C. (2019). Capturing deliberative argument: An analytic coding scheme for studying argumentative dialogue and its benefits for learning. *Learning, Culture and Social Interaction*, 36.
- Freedman, E. B. (2020). When discussions sputter or take flight: Comparing productive disciplinary engagement in two history classes. *Journal of the Learning Sciences*, 29(3), 385–429.
- Gao, F. (2011). Designing a discussion environment to promote connected and sustained online discussion. *Journal of Educational Media and Hypermedia*, 20(1), 43–59.
- Gao, F., Zhang, T., & Franklin, T. (2013). Designing asynchronous online discussion environments: Recent progress and future directions. *British Journal of Educational Technology*, 44(3), 469–483.
- Grossen, M., & Muller Mirza, N. (2020). Interactions and dialogue in education: Dialogical tensions as resources or obstacles. In N. Mercer, R. Wegerif, & L. Major (Eds.). *The Routledge international handbook of research on dialogic education* (pp. 597–609). New York: Routledge.
- Hewitt, J. (2001). Beyond threaded discourse. *International Journal of Educational*

- Telecommunications*, 7, 207–221.
- Hewitt, J. (2005). Toward an understanding of how threads die in asynchronous computer conferences. *Journal of the Learning Sciences*, 14(4), 567–589.
- Hirst, E., & Renshaw, P. D. (2004). Diverse voices, dialogue and intercultural learning in a second language classroom. In J. Linden & P. D. Renshaw (Eds.), *Dialogic learning: Shifting perspectives to learning, instruction, and teaching* (pp. 87–107). Springer.
- Juzwik, M. M., Nystrand, M., Kelly, S., & Sherry, M. B. (2008). Oral narrative genres as dialogic resources for classroom literature study: A contextualized case study of conversational narrative discussion. *American Educational Research Journal*, 45(4), 1111–1154.
- Liu, S., Kang, L., Liu, Z. et al. (2023). Exploring the relationships between students' network characteristics, discussion topics and learning outcomes in a course discussion forum. *Journal of Computing in Higher Education*, 35, 487–520.
- Liu, S., Liu, S., Liu, Z., Peng, X., & Yang, Z. (2022). Automated detection of emotional and cognitive engagement in MOOC discussions to predict learning achievement. *Computers & Education*, 181, 1-16.
- Mercer, N. (1995). *The guided construction of knowledge: Talk amongst teachers and learners*. Multilingual Matters.
- Monea, B., Burrows-Stone, K., Dunbar, J. G., Freed, J., Stornaiuolo, A., & Griffin, A. (2022). “Live within the messiness”: How a digitally mediated inquiry community supported ELA teachers in cultivating adaptive repertoires. *English Teaching: Practice and Critique*, 21(4), 413–427.
- Nichols, T. P., & Stornaiuolo, A. (2019). Assembling “digital literacy”: Contingent pasts, possible futures. *Media & Communication*, 7(2), 1–10.

- Nielen, T. M. J., Smith, G. G., Sikkema-de Jong, M. T., Drobisz, J., van Horne, B., & Bus, A. G. (2018). Digital guidance for susceptible readers: effects on fifth graders' reading motivation and incidental vocabulary learning, *Journal of Educational Computing Research*.
- Nystrand, M., Gamoran, A., Kachur, R., & Prendergast, C. (1997). *Opening dialogue: Understanding the dynamics of language and learning in the English classroom*. Teachers College Press.
- Nystrand, M., Wu, L. L., Gamoran, A., Zeiser, S., & Long, D. (2003). *Questions in time: Investigating the unfolding structure of classroom discourse*. National Research Center on English Learning and Achievement.
- Parker, W. C. (2001). Classroom discussion: Models for leading seminars and deliberations. *Social Education*, 65(2), 111–115.
- Parker, W. C. (2010). Listening to strangers: Classroom discussion in democratic education. *Teachers College Record*, 112(11), 2815–2832.
- Ravenscroft, A., & Matheson, M. P. (2002). Developing and evaluating dialogue games for collaborative e-learning: Dialogue games for collaborative e-learning. *Journal of Computer Assisted Learning*, 18(1), 93–101.
- Rovai, A. P. (2007). Facilitating online discussions effectively. *Internet and Higher Education*, 10, 77–88.
- Sawyer, R. K. (2004). Creative Teaching: Collaborative Discussion as Disciplined Improvisation. *Educational Researcher*, 33(2), 12–20.
- Scardamalia, M. (2004). CSILE/Knowledge Forum. In *Education and technology: An encyclopedia* (pp. 183–192). ABC-CLIO.

- Sherry, M. B. (2014). Indirect challenges and provocative paraphrases: Using cultural conflict-talk practices to promote students' dialogic participation in whole-class discussions. *Research in the Teaching of English*, 49(2), 141–167.
- Sherry, M. B. (2017). How the visual rhetoric of online discussion enables and constraints student participation. *Journal of Adolescent & Adult Literacy*, 61(3), 299–310.
- Sherry, M. B. (2020). Three strategies for better online discussions. *Educational Leadership*, 77(7), 72–74.
- Sherry, M. B. (2021). *How to facilitate meaningful classroom conversations across disciplines, grade levels, and digital platforms*. Rowman & Littlefield Publishers, Inc.
- Smith, G.G. (2017, July). Adding peer interaction to reading, web-based eBooks with Computer Games, *Proceedings of the annual meeting of EduLearn*, Barcelona, Spain
<https://library.iated.org/view/SMITH2017ADD>.
- Smith, G. G., Haworth, R., & Žitnik, S. (2020). Computer science meets education: Natural language processing for automatic grading of open-ended questions in eBooks, *Journal of Educational Computing Research*, 58(7), 1227–1255.
- Smith, G.G., Li, M., Drobisz, J., Park, H., Kim, D., & Smith, S. D. (2013). Play games or study? Computer games in eBooks to learn english vocabulary, *Computers & Education*, 69, 274-286, <http://authors.elsevier.com/sd/article/S0360131513001826>
- Smith, G. G., Besalti, M., Nation, M., Feldman, A. & Laux, K. (2019). Teaching climate change science to high school students using computer games in an intermedia narrative, *Eurasia Journal of Mathematics, Science and Technology Education* (Special Issue on Enhancing Environmental Literacy in K-12 Science Classrooms), 15(5).
- Stahl, G. & Hakkarainen K. (2021). Theories of CSCL. In U. Cress, C. Rose, S. Wise, & J.

- Oshima (Eds.) *International handbook of computer supported collaborative learning* (Pp. 23-43). Springer.
- Stockton, F. R. (1882, November). The lady, or the tiger? *The Century*, 25(1), 83–86.
- Sun, Y., & Gao, F. (2017). Comparing the use of a social annotation tool and a threaded discussion forum to support online discussions. *Internet and Higher Education*, 32, 72–79.
- Wegerif, R., & Mercer, N. (1997). A dialogical framework for researching peer talk. In R. Wegerif & P. Scrimshaw (Eds.), *Computers and Talk in the Primary Classroom* (pp. 49–65). Multilingual Matters.
- Wegerif, R. (2006). A dialogic understanding of the relationship between CSCL and teaching thinking skills. *International Journal of Computer-Supported Collaborative Learning*, 1(1), 143–157.
- Wegerif, R. (2013). *Dialogic: Education for the internet age*. Routledge.
- Wegerif, R. (2019). Towards a dialogic theory of education for the Internet Age. *The Routledge International Handbook of Research on Dialogic Education*, 14. Taylor & Francis Group.