DIALOGUE TIME: SYNCHRONOUS VERSUS ASYNCHRONOUS ONLINE DISCUSSIONS

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ABSTRACT

Prior research compared synchronous versus asynchronous online discussions typically using different formats (linear SMS-chat for synchronous versus threaded for asynchronous) and focused on individual posts. We compared both using the same linear chat format and analyzed entire discussions, seeking to resolve previous conflicting results. We examined uptake and dialogic spells (conversations) in linear chat discussions within web-based eBooks. In master's courses, nine synchronous and nine asynchronous discussions were compared using mixed methods: qualitative coding, statistical analysis, and discourse analysis. The results showed that synchronous discussions had more posts, while asynchronous had longer posts. Synchronous discussions featured longer dialogic spells, more conversational tangles, and frequent repair of these tangles. Synchronous chats were more social, coherent, and collaborative; asynchronous discussions were more formal with more complex individual postings. We propose that instructors could leverage synchronous online discussions to foster social cohesion, enhance student uptake, and support dialogic discourse. Conversely, if instructors aim to achieve more uptake than in threaded discussions, while encouraging more formal elaboration of individual positions in response to discussion questions, asynchronous linear discussions may prove effective. Synchronous online discussions foster greater social cohesion through social exchanges which encourage social bonding and promote collaborative knowledge building.

Keywords: Online discussion forums, dialogue, synchronous, asynchronous, online learning.

INTRODUCTION

Online discussions, common in online courses, can extend conversations beyond the classroom. Academic conversations that succeed in online forums often share features with successful in-person discussions. Successful discussions rely on participants' abilities to interpret, cite, respond, disagree, deliberate, and develop ideas, often using shared terms and phrases from texts and other's contributions (Rojas-Drummond et al., 2016; Hennessy, 2024). These moves are different forms of uptake, referencing prior contributions, which can create community (Wang & Woo, 2007) and can promote critical thinking (Sherry, in press). Indeed, the uptake of what others have already written or said is a valued academic practice across cultures, grade levels, disciplines, and digital platforms (Sherry, 2021). Online class discussion forums provide a critical space for students to learn, practice, and model these skills.

Yet online discussions can not only extend but can also differ from the space/time of classroom conversations. Just as the arrangement of desks in a classroom can enable or constrain conversation, online discussion participation depends on the platform. Online discussions in Learning Management Systems are typically threaded, forming hierarchical structures that can isolate students, limiting uptake (Gao, 2011; Hewitt, 2005; Sherry, 2017). Some alternative platforms, e.g., anchored discussions with social annotation, attempt to organize student participation and enhance coherence by connecting posts to specific locations in a text, image, or video (Sun & Gao, 2017). But anchored forums can also separate posts from other, potentially related contributions (Sherry et al., 2025). Opportunities remain to study how different types of online forums change the spatial relationship among posts in ways that support or constrain uptake.

Importance of the Research

Online discussions can also differ from face-to-face conversations in how they manage time. For example, participants in online forums may use not only oral but also visual and written modes that change how others receive and process their responses in time (Wegerif, 2016; Wegerif, 2021). Written online discussions may deter struggling readers yet can also encourage introverts to participate (Larson & Keiper, 2002). Participation in online discussions may also be synchronous or asynchronous: participants can respond at the same time (synchronously) as in a face-to-face classroom, or they can post asynchronously, sometimes with long gaps between responses. Asynchronous online discussions can offer students time for thoughtful responses, but navigating lengthy threads can be confusing (Zhu, 2006). Research remains to be done on how the unique temporal features of online discussions can also enable or inhibit uptake.

Some researchers have combined these lines of inquiry, comparing synchronous and asynchronous conversations in different forums. Hrastinski (2008) compared asynchronous, threaded discussions to synchronous chat linear, text-based discussions found in social media, finding that asynchronous discussions favored reflection and complex ideas, while synchronous favored social, concise, but shallower discourse. Not just Hrastinski (2008), but all the studies we found compared asynchronous threaded discussions to synchronous linear chat discussions.

Another noteworthy recent study, Wu and Ouyang (2024) compared asynchronous and synchronous discussions in terms of types of discourse (in three dimensions, cognition, regulation and emotion) and the roles that discussants assumed in these different modalities, as the same students first discussed asynchronously and then later discussed synchronously leading up to collaborative writing. One notable difference was that asynchronous discussion featured no regulation (e.g., planning, task reflection), while the synchronous discussion did involve regulation. Of course, the synchronous discussions, with smaller groups, were framed around a collaborative task, a common use of synchronous, but not asynchronous, discussions. The discussant roles found across both modalities were "knowledge constructor," "task follower," "isolated explorer", and "lurker." In synchronous discussions, there were more "knowledge constructors," "task followers," and "isolated explorers, but fewer "lurkers."

Molnar and Kearney (2017) noted greater engagement with content in synchronous discussions. Furthermore, Dahlstrom-Hakki et al. (2020) found that disabled or neurodivergent students self-reported higher engagement in synchronous discussion while performing more poorly on learning outcomes compared to similar students in an asynchronous setting. Similarly, Riel et. al (2022) found little difference in learning outcomes between synchronous and asynchronous discussion as measured on a written post-test. These studies reported that discussing in real-time itself may require a higher cognitive load and distract some students from the deep thinking required in online discussion. Martin et al.'s (2021) meta-analysis on synchronous versus asynchronous online learning found small, but significantly better cognitive outcomes in synchronous learning (cf., Dahlstrom-Hakki et al., 2020). On the other hand, Zeng and Luo's meta-analysis (2024) found that asynchronous learning was more effective in promoting student knowledge than synchronous online learning, but the effect was trivial in size. These contradictory results suggest further research is needed on synchronous and asynchronous discussions in different kinds of online forums, especially with regard to students' uptake of other's contributions. Our inquiry asked: how might synchronous versus asynchronous discussions support or inhibit students' uptake of others' contributions?

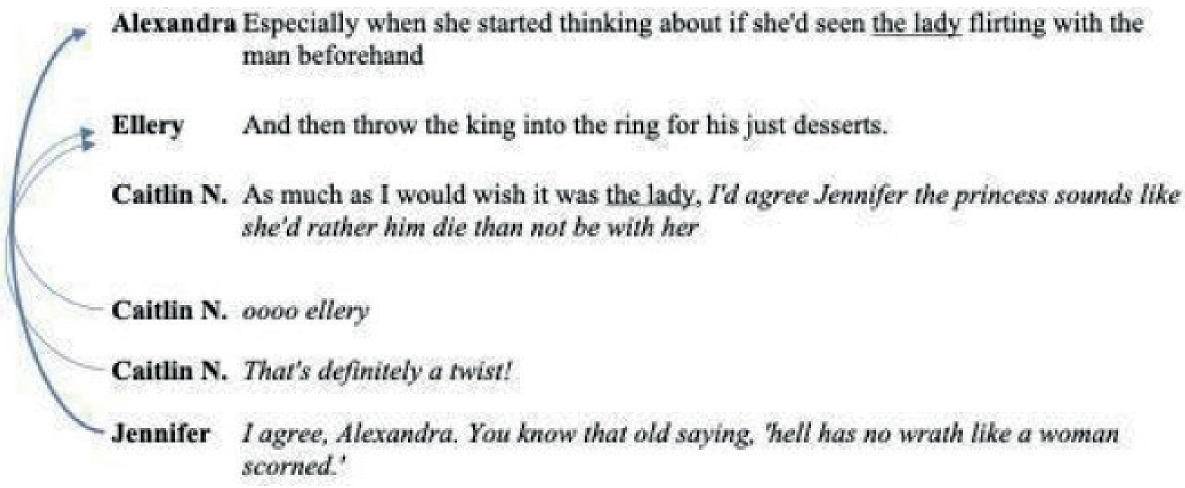
Theoretical Framework

The Communities of Inquiry (CoI) model (Garrison, Anderson, & Archer, 2000) partially framed our study. COI posits that learning experiences in online environments occur at the intersection of three presences: social, cognitive, and teaching (Garrison et al., 2000). Social Presence promotes projecting oneself, socially and emotionally, through computer-mediated communication, so that one is perceived as "a real person" in an online environment. It depends on interaction among students and with the instructor, and it assumes movement from introduction to community to camaraderie. Social presence occurs before cognitive and teaching presence occurs. Cognitive Presence means students cognitively engage with the course content. It assumes a four-phase process, where students: (a) encounter an event, issue, or problem, (b) explore content through discussion and reflection, (c) construct meaning and knowledge by discussing ideas, and (d) apply the acquired knowledge. Teaching Presence, a significant factor in student satisfaction with learning, involves the design of the course, facilitation of the four phases of Cognitive Presence, direct instruction, and answering student questions.

Our study focuses on how modality (asynchronous vs. synchronous) impacts students' uptake of peers' contributions in online discussions, with implications for Social, Cognitive, and Teaching Presences. The design of the online platform, although often beyond teachers' control, influences students' interaction possibilities (Social Presence) and their engagement with course content (Cognitive Presence).

To explore uptake, how students incorporate others' ideas, we draw upon Bakhtin's (2010) dialogism theory that explores utterance relationships and dialogic discussions, as communal inquiry using shared language (Applebee et al., 2003; Nystrand et al., 1997). In dialogic discussions, students reference others' contributions (e.g., Applebee et al., 2003; Hennessy, 2024), a key aspect of academic and civic discourse (Parker, 2010; Sherry, 2014, 2021), facilitating idea sharing and idea development through dialogue. Some dialogic conversations involve chains of related turns from multiple participants, termed dialogic spells (Smith, et al., 2008; Nystrand et al., 1997) that often accompany increased participation and conversational coherence. We coded synchronous/asynchronous dialogic discussions for uptake (and missed uptake opportunities, termed tangles) while tracking the frequency and length (number of turns) of dialogic spells.

For instance, in Figure 1, Alexandra, Caitlin, and Jennifer engage in a dialogic spell of three posts exploring the potential influence of the princess's jealousy on her actions.



Alexandra Especially when she started thinking about if she'd seen the lady flirting with the man beforehand

Ellery And then throw the king into the ring for his just desserts.

Caitlin N. As much as I would wish it was the lady, *I'd agree Jennifer the princess sounds like she'd rather him die than not be with her*

Caitlin N. *oooo ellery*

Caitlin N. *That's definitely a twist!*

Jennifer *I agree, Alexandra. You know that old saying, 'hell has no wrath like a woman scorned.'*

Note: Words are underlined; the uptake of ideas is italicized.

Figure 1. A Tangle Interrupts a Dialogic Spell and is Resolved

Caitlin and Ellery interrupted this dialogic spell by envisioning an alternative ending, involving the king (rather than the princess's lover) being thrown into the ring. This interruption, a tangle, could have severed both conversation threads, potentially preventing a dialogic spell. However, Jennifer's final comment resolved the tangle by re-engaging with the intervening posts.

Tangles in online discussions resemble a phenomenon in face-to-face conversations called production blocking: when group members must await their turn to express ideas, this can hinder idea generation, cognitive flexibility, and group productivity during brainstorming (Nijstad et al., 2003). Collaborative efficiency may suffer when participants prioritize their own ideas over listening (Jeong & Chiu, 2020). In online platforms, asynchronous threaded discussions can contribute to production blocking (Jeong & Chiu, 2020), as long threads of postings create tangles.

In our study, we used linear chat discussions, instead of threaded discussions, to overcome the hierarchical structure that can hinder uptake, especially in synchronous settings. Linear chat, resembling Facebook instant messaging (See Figure 2), was chosen for its suitability to both synchronous and asynchronous interactions. We compared synchronous versus asynchronous linear chat dialogic discussions, in terms of uptake and length of dialogic spells, etc.

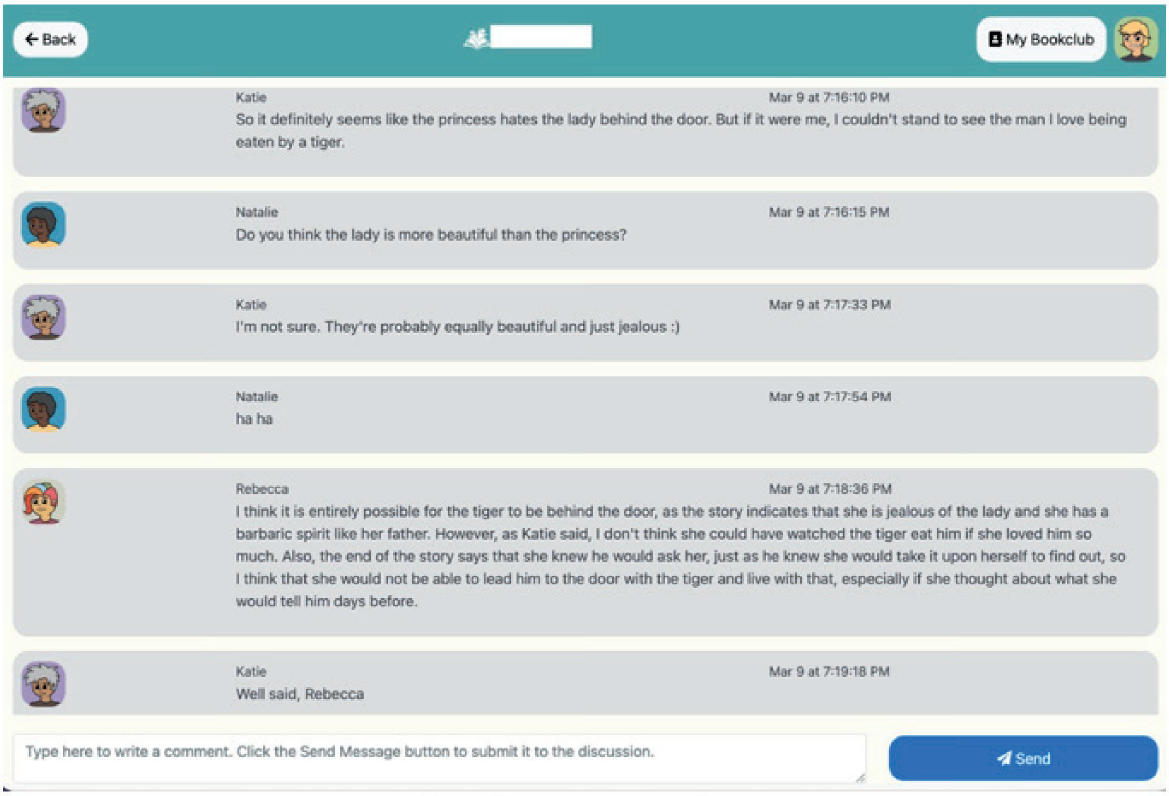


Figure 2. Interface for discussion.

Research Questions

Research question 1: How do synchronous and asynchronous linear chat discussions differ in terms of: (a) formality, (b) socialness, (c) interruptions (or tangles) of conversations (dialogic spells), (d) return to interrupted conversational themes, (e) length of postings and (f) length of conversations?

Research question 2: How do synchronous/asynchronous linear chat discussions differentially facilitate the uptake of others' words/ideas?

METHOD

We compared asynchronous versus synchronous online discussions, in the context of web-based eBooks, using mixed methods (Johnson & Onwuegbuzie, 2004). Specifically, we analyzed discourse in 711 total postings, from 18 discussions among small groups (three to six per group) of 73 master's students, who had provided their informed consent and who were enrolled in three sections of a Library Sciences course from 2020-2022 at an R1 public university in the US. The number of students in the groups varied, as some students did not participate in the online discussions.

Instruments

We used the web-based e-book system for this research because it is a flexible research tool for investigating individual and group interaction about reading a course-related text. The web-based e-books system has been used in six-plus studies in five countries, the United States, Netherlands, Slovenia, Saudi Arabia, and China (Alsofyani, 2019; Smith et al., 2019; Nielen, et al., 2018; Feldman, et al., 2017; Smith, et al., 2020; Smith, et al., 2013).

Since participants did not have experience with web-based e-books, we first provided a video that introduced them to the interface. All students read a classic short story called "The Lady, or the Tiger?" by Frank R. Stockton, published in 1882. This story, often anthologized for secondary students, features a provocative, undetermined ending. A commoner engages in forbidden romance with the king's daughter, and as punishment must select one of two doors in the arena, from which issues either a ferocious tiger or a comely lady, not the king's daughter, to whom he must marry. At the last moment, the commoner notices the princess nod her head towards one of the doors. The reader is asked to speculate what happens next. The researchers chose this story because its non-deterministic ending might provoke discussion.

After reading the story, students addressed these two 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? Do NOT write fiction, but rather speculate and provide support."

We designed these Open-ended Higher Order (OHOT) questions, without one correct answer, to provoke Higher-Order Thinking (not rote recall of events) and dialogic discussion (Nystrand et al, 2003; Sherry, 2017).

To clearly compare the effects of synchronous and asynchronous discussions, the online discussions were unmoderated, since instructor moderation would increase the power differential, introducing a confounding variable. Students read "The Lady, or the Tiger?" in the web-based e-book and then engaged in one linear chat discussion. At the end of the discussion, each group was required to collaboratively write a response to the questions in a shared writing space similar to a Google Doc.

Procedure

Students were randomly divided into small discussion groups. Half of the groups received written instructions to discuss asynchronously. Half received instructions to contact their fellow discussants, beforehand by email and set up appointments to meet in the web-based eBook system to discuss synchronously. Later, researchers examined the timestamps on downloaded discussion transcripts to determine which student groups discussed synchronously or asynchronously. All discussion directions, the eBook system URL, and orientation videos were presented in Canvas.

Data Collection and Data Analysis

We downloaded 18 discussions from online forums into an Excel spreadsheet for analysis. Of these, nine were asynchronous, and nine were synchronous. We had instructed nine groups to chat synchronously and nine asynchronously. We determined the actual discussion mode (synchronous or asynchronous) by examining whether the gaps between timestamps on postings were consistent with the directions to engage in synchronous or asynchronous discussions.

All discussions involved three to six participants, because we thought this size group increased participation from each student, deeper engagement with the topic, more opportunity for individual contribution, more uptake of each other's ideas, and a greater sense of responsibility for the discussion's success.

Each posting was recorded in a single spreadsheet cell. We first applied, and then adapted, extrinsic codes derived from prior dialogic discussion research (e.g., Nystrand et al., 1997; Sherry, 2020) about uptake and dialogic spells. To establish inter-rater reliability, we: (a) collaboratively coded one discussion; (b) independently coded three discussions, entering codes into a shared Excel file; and (c) calculated inter-rater reliability. The Kappa value was 0.942, considered sufficient for further data analysis (McHugh, 2012).

We deployed a mixed method, specifically an exploratory sequential design (Creswell, 1996, 1999; Creswell et al., 2023), with first qualitative and then quantitative analysis, to first explore the discussions more deeply for trends and then to test quantitatively the verity of our observed trends.

First, we qualitatively conducted discourse analysis (Gee, 2014) of the online discussions, because it provides insights into the flow of discussion and student uptake of other's ideas.

Next, to provide numeric and relatively more objective evidence, we conducted quantitative analysis, in the downloaded Excel files of online discussion, and sometimes simply counting the number of rows (postings) in an online discussion or using an Excel formula to compute the average number of words per posting in specific discussions. We also conducted statistical analyses (using SPSS), comparing asynchronous and synchronous online discussions, on discussion posting types, uptake-to-turns ratio, and dialogic spell length/frequency, using independent samples t-tests. This addressed our research question on how synchronous and asynchronous discussions in linear chat forums either facilitate or hinder the uptake of others' contributions.

Qualitative Coding Categories

The first level of coding was deciding whether, and how, each posting fit (or didn't fit) into a conversational topic. We called a sequence of postings that follow one conversational topic a "dialogic spell" (Smith & Sherry, 2025; Nystrand et al., 1997). A dialogic spell could be interrupted by another dialogic spell (topic), in what is what we called a "tangle." The tangle was "resolved" if subsequent postings returned to the dialogic spell that had been interrupted either by another dialogic spell or a one-off posting. We included columns labeled "Dialogic spell." We numbered dialogic spells in the order of their initial appearance. In Appendix A, all postings in one dialogic spell were labeled as "2", while postings in the next dialogic spell are labeled "3." One-off comments that were not part of an ongoing dialogic spell were left blank.

Another level of qualitative coding was classifying each post as being of a "Discussion Type." Appendix B shows the discussion types we coded. These were extrinsic codes drawn from prior research on dialogic discussions (e.g., Nystrand et al., 1997; Sherry, 2020).

FINDINGS

We address quantitative results and qualitative comparisons of students' uptake during synchronous and asynchronous discussions, starting with quantitative.

Quantitative Findings

Our statistical analysis, using independent samples t-tests, provides overwhelming evidence that asynchronous and synchronous discussions differ dramatically. Synchronous discussions ($M = 83.7$, $SD = 17.1$) were significantly longer in the number of posts than asynchronous discussions ($M = 26.4$, $SD = 25.1$), $t(16) = 4.24$, $p = 0.001$. Cohen's d of 2.4 effect size was very large, indeed. Asynchronous discussions had significantly more average words per post ($M = 35.1$, $SD = 23.1$) than did synchronous discussions ($M = 12.4$, $SD = 2.0$), $t(16) = 4.7$, $p = 0.003$. Cohen's d of 1.0, was a large margin. Synchronous discussions were "longer," while asynchronous discussions were "wider." More posts in synchronous discussions formed ongoing conversations, or dialogic spells ($M = 73.5$, $SD = 14.2$), 88%, compared to 68% for asynchronous discussions ($M = 18.0$, $SD = 23.9$). This was significant, $t(16) = 4.9$, $p = 0.001$. Cohen's d was 2.5. Put differently, synchronous discussions were more coherent.

We also examined coherence related to interruptions in dialogic spells, or tangles. For example, a student question might go unanswered, or an intervening, unrelated post might interrupt a sequence of turns that included uptake. Sometimes these tangles forced the conversation onto a different topic; other times participants resolved a tangle and continued the line of inquiry. The average number of tangles was significantly greater in synchronous discussions ($M = 3.7$, $SD = 1.3$) than in asynchronous discussions ($M = 0.93$, $SD = 1.6$), $t(16) = 3.7$, $p = 0.005$. The effect size, Cohen's d was 1.8, was large. This might be explained by the length of synchronous discussions: longer conversations produce more tangles. However, the number of resolutions of tangles was also significantly greater in synchronous discussions ($M = 3.5$, $SD = 1.0$) than in asynchronous discussions ($M = 0.29$, $SD = 0.6$), $t\ (16) = 8.1$, $p = 0.005$. Cohen's d-effect size of 4.6 was striking. Indeed, 95% of tangles were resolved in synchronous discussions, compared to only 31% of tangles in asynchronous discussions.

In sum, synchronous and asynchronous discussions differed significantly in length, width, and coherence, and the number and resolution of interruptions, or tangles. We explore these results qualitatively in the following section.

Qualitative Findings

Although we started with a larger number of qualitative coding categories, collapsing the coding of the categories into a small number of broader categories made qualitative analysis and its relationship to quantitative results clearer. Thus, we used the following three broad categories defined by Parker (2006):

Interpretive - interpret, or analyze, a central text/artifact (e.g., a reading, an image, a video, etc.). ("What does this mean?")

Deliberative - deliberate, or decide about, a situation that requires choosing among possible actions (e.g., a moral dilemma, a word choice, etc.). ("What should be done?")

Social/Procedural - foster community and consensus regarding the nature of the task (e.g., introductions, directions, possible roles). ("How ya doin'?" "What are we doing together? How should we do it?") ("How do we complete the assignment?).

Across the 711 total posts, qualitative coding revealed that different discussion-post types fell into three common, broad categories: (1) "Interpretative" (or "Seminar") accounted for 370 posts; students discussed interpretations of the assigned text. (2) "Deliberation", constituted 134 posts. Students deliberated, primarily engaging in decision-making about upcoming collaborative writing. (3) Most of the remaining posts (204) fell into other categories, i.e., social, procedural, and user-experience comments (which we collapse into "social/procedural"). Our analysis suggested that interpretative, deliberative, and social/procedural posts were integral to the differences and the relative success of both synchronous and asynchronous discussions. Moreover, it was useful to explore moments when students pivoted (or switched) from one type of posting to another.

The qualitative analysis parallels and explains the significant quantitative effects. Therefore, we organize the qualitative findings by the significant effects in the quantitative analysis, leveraging the three broad discussion qualitative posting categories: interpretive, deliberative, and social/procedural.

More Synchronous Posts, More Asynchronous Words

Why did synchronous discussions average more posts, while asynchronous discussions averaged more words per post? Qualitative analysis revealed that participants in synchronous discussions started with social/procedural posts (e.g., "Hello!" "Sorry for the delay," or "So do we share our answers?"). The following synchronous discussion excerpt shows participants pivoting from socializing to interpretation to deliberation.

1. **Mindy:** Perfect, we are all here
2. **Julie:** Sorry for the delay!
3. **Nadina**: In terms of just answering, I feel like the tiger was behind the door, and later the King puts his daughter to trial…
4. **Julie**: That's exactly what I think as well.
5. **Mindy**: No problem. :) So to jump right in, when I read I felt like she sent him to the door with the tiger. OK, we all thought the tiger!
6. **Nadina**: Does this mean we are barbaric, too?
7. **Mindy**: Ha ha, maybe! So if the King puts his daughter on trial, does that mean he sets her up with 2 doors as well?
8. **Julie**: lol no, it just seemed like what happened based on her father, and her own jealous nature.
9. **Mindy**: Yes, she did seem very jealous. The story led me to believe she would rather nobody have him if she could not.
10. **Nadina**: From my thoughts, I thought yes, he sets up 2 doors for her and lets the trial decide.

11. **Julie**: I think so. Even though the story said he loved her so much, I think his barbaric nature would take over his reasoning.
12. **Mindy**: OK, so what happens then? Do we choose which door she opens?
13. **Julie**: Are we all supposed to write our answers below?

Although initial social/procedural posts might seem unnecessary, they established an initial bond and sense of immediacy that continued throughout the discussion (e.g., "Ha ha, maybe!" "Lol, no"). Shorter posts allowed space for others to respond sooner, encouraging uptake. More frequent turns also allowed participants to pivot together smoothly from one type of discussion to another. In short, shorter posts and socializing contributed not only to length but also to coherence.

In contrast, greetings and social/procedural elements were largely missing in asynchronous discussions.

1. **Louise:** I think the lady is behind the door. If she truly loved him as the story seems to claim, she would not have wanted him mauled. Plus, if she wants a future with any man she wouldn't want the world to see her first lover as someone who deserved to be punished. I honestly don't think the king would have done anything after discovering his daughter broke the law. He probably covered it up or considered her already punished through her lover's fate.
2. **Anna:** I think the lady is behind the door. Regardless of how jealous you may be, you can't really love someone and also be able to tolerate watching them get torn apart by a wild animal. The King does seem unstable enough to put his daughter on trial via the lady and the tiger method. I imagine she'd use her own connections to find out which door had the tiger behind it and which door had a suitor.
3. **Andrea:** I think the tiger was behind the door. Mostly because of the princess being described as "hot-blooded and semi-barbaric."

Each discussant provided a formal answer to the teacher-supplied questions upon entering the conversation, with no uptake of preceding posts. Without the social bond of synchronous participation, participants focused on fulfilling the assignment, rather than on uptaking others' interpretations. On the other hand, the asynchronous post allowed each individual more time to fully ponder and then resolve their thought process in a singular post. Thus, interpretive posts in asynchronous forums were more elaborate, but the overall conversation was less coherent. This explains why synchronous discussions averaged more posts, while asynchronous discussions averaged more words per post.

More Dialogic Spells in Synchronous Discussions

Why did synchronous discussions have longer, more frequent dialogic spells than asynchronous discussions? See Figure 3.

1. **Nadina**: Is the second sentence for part 2 okay?
2. **Julie**: Should we mention that love didn't weigh in to either of their decisions?
3. **Mindy**: I like it. It draws from the story.
4. **Nadina**: Probably yes
5. **Mindy**: Good idea.
6. **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...
7. **Nadina**: I mean I think it states that the king does love the daughter at some point though. 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
8. **Mindy**: Maybe write that the king, despite his love for his daughter, could only act in a barbaric manner. He was tied to his own idealistic principles?

Figure 3. A typical sequence in a synchronous discussion

This excerpt featured constant uptake, signaled by repeated words, ideas, and pronouns (it, he, she, his, her, that) referencing previous contributions. Underlining these words/ideas shows uptake. Connecting arrows demonstrate the cohesion this uptake created, across postings. Moreover, students posed questions at 1, 2, 6, and 8. Uptake and student questions signal dialogs in face-to-face discussions (e.g., Nystrand, et al., 1997; 2003). In Figure 4 (synchronous discussion), student questions invite deliberative decision-making about collaborative writing, prompting subsequent responses with uptake and a dialogic spell.

In contrast, asynchronous discussions followed a less cohesive pattern:

1. **Wayne**: P1: I believe the tiger is behind the door.

   P2: I believe the king would send his daughter to the arena too. Given his barbaric nature. However, he too may indicate which door the tiger waits behind.
2. **Stephanie**: I think the lady is behind the door. She will lose him, but she does not want to see him die.

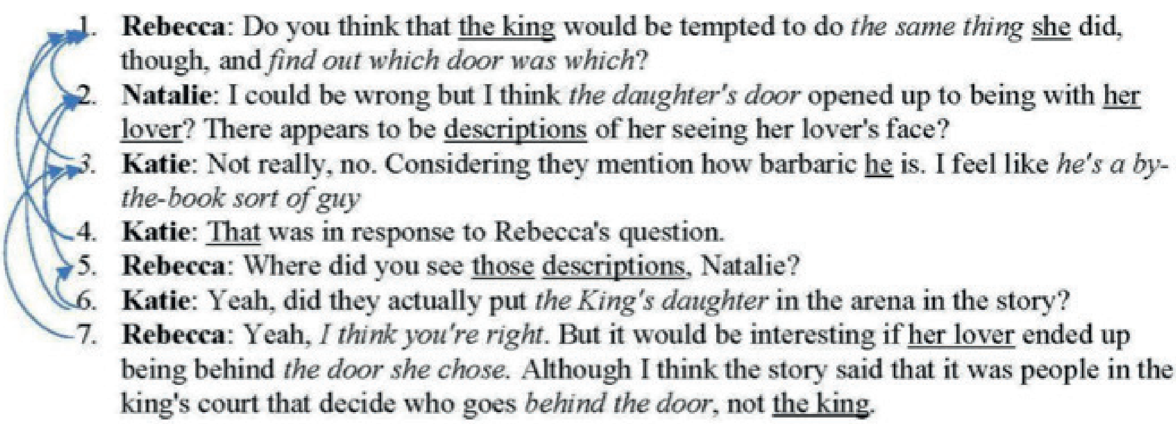
   P2: The king may send his daughter to the arena, but he will not allow her to die, so he puts a man of his choosing behind the door for her to marry. He signals to her to choose that door.
3. **John**: I have no guess as to which is behind the door. Is it unclear whether or not she is even instructing him to choose the door on the right side? She could have raised her right hand to signal "DON'T go in that door, the tiger is there."

   Part 2: The daughter is "the apple of the king's eye", therefore, I believe he will not disclose this knowledge to anyone. This would save her from a trial.

In this asynchronous discussion, students make long posts with labeled responses to parts one and two of the discussion questions, formally staking out their positions. While some posts repeated the same language as previous contributions ("...behind the door…" and "send his daughter to the arena"), and some students posed questions (e.g., "Is it unclear whether or not she is even instructing him to choose the door on the right side?"), these conversational moves did not function as uptake or elicit responses leading to dialogic spells. Perhaps the longer, more formal nature of these posts buried moments of uptake and authentic questions by students, thereby limiting dialogic spells in asynchronous discussion.

More Tangles in Synchronous Discussions, but More Often Resolved

During qualitative coding, we noticed tangles: interruptions in what otherwise might have formed an ongoing dialogic spell. For example, an authentic student question might go unanswered, or an intervening, unrelated post might interrupt a sequence of postings that included uptake. Sometimes these tangles forced conversation onto a different topic. At other times, participants resolved a tangle and returned to the same theme. The following is an excerpt from a synchronous discussion (Figure 4) that shows how a tangle in a synchronous discussion and how it was resolved.



1. **Rebecca**: Do you think that the king would be tempted to do *the same thing* she did, though, and *find out which door was which*?
2. **Natalie**: I could be wrong but I think *the daughter's door* opened up to being with her lover? There appears to be descriptions of her seeing her lover's face?
3. **Katie**: Not really, no. Considering they mention how barbaric he is. I feel like *he's a by-the-book sort of guy*
4. **Katie**: That was in response to Rebecca's question.
5. **Rebecca**: Where did you see those descriptions, Natalie?
6. **Katie**: Yeah, did they actually put *the King's daughter* in the arena in the story?
7. **Rebecca**: Yeah, *I think you're right*. But it would be interesting if her lover ended up being behind *the door she chose*. Although I think the story said that it was people in the king's court that decide who goes *behind the door*, not the king.

Figure 4. A tangle appears and is resolved in a synchronous chat discussion

In this intensely dialogic exchange, Katie responded at 3 to an earlier post by Rebecca ("Not really, no") in a way that could have created confusion or seemed rude if connected to Natalie's intervening post. However, Katie recognized this instantly and made another post, pointing out the tangle ("That was in response to Rebecca's question"). Moreover, instead of ignoring Natalie's post, both Katie and Rebecca responded with questions, and Rebecca's post at 7 synthesized, taking up both of her classmates' ideas. Why were there significantly more tangles in synchronous discussions? Perhaps, with more and shorter postings, there were more opportunities to create tangles, as participants responded simultaneously to others' posts. Yet with shorter, frequent postings, participants could also quickly identify and resolve a tangle, allowing a dialogic spell to persist.

In contrast, the following excerpt, Figure 5, shows how a tangle occurred in an asynchronous chat discussion forum:

Emily: Part 2: With the events led, created, and executed by the king, one would believe he would *send his daughter to the arena* as she has committed a crime, embarrassed the king, and *went against the rules*. He is semi-barbaric so he will probably feel guilt as the story states he loves his daughter, but *he is also king*. He wants to *keep in power* and with these events, *shows his power* to rule over life and death. His character would choose fame, power, and glory over love as with these events, sympathy is not a strong theme in this story.

Hi Douglas, I like your point in Part 1 about semi barbarous but I feel she showed her mercy in dwelling on the issues day and night, losing sleep, and imagining both scenarios. The readers feels the guilt she portrays, but in the end I believe with her being the daughter of the king who created this judicial system, and growing up around these barbarous events, she sent him into the lions den - literally!

Helen: I have never heard this story before... and I was wondering if it is some kind of folk tale? Has anyone else seen this story before and do you know what culture it is from?

Teresa: Hi Helen! I actually had the same question as I had never heard this story before. So I did some research! This short story was written by Frank Stockton in 1882. Stockton wrote a follow up to this story called The Discourager of Hesitancy. He seems to like open-ended stories like these.

Sarah: Thanks for the info and research. I was wondering about this story as well. I've never read it before.

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.

Figure 5. How a tangle occurred in an asynchronous chat discussion

In this excerpt, Emily addressed the prompt by labeling "Part 2" in her response. But she also replied to Douglas, commenting about the princess's "semi-barbarous" nature. However, Douglas did not reply to Emily, and her uptake did not produce a dialogic spell. Instead, Helen, Teresa, and Sarah exchanged posts about the story's origins. Although these final three posts formed a dialogic spell, it was again interrupted by a tangle, this time by Sarah, who followed up her own reply to Teresa by posting another response to the prompt. Indeed, the participants in this discussion all pivoted back and forth from posts that fulfilled the two prompts to posts that took up others' interpretations but were developed no further. However, unlike participants in synchronous discussions, who often pivoted together from socializing to interpretation and deliberation, and could quickly identify and resolve tangles, pivoting in asynchronous discussions seemed to occur independently, and thus contribute to tangles, as in the excerpt above (Figure 6), by obscuring uptake.

DISCUSSIONS AND CONCLUSION

Our quantitative and qualitative analyses showed that synchronous and asynchronous discussions differed significantly in length, width, and coherence, as well as in the number and resolution of interruptions, or tangles. Synchronous posts were shorter and more numerous, while asynchronous postings were longer and fewer. Synchronous forums often included social interactions, and participants pivoting together from one discussion purpose to another, creating long/frequent dialogic spells and more tangles (though the tangles were more often resolved). In contrast, longer asynchronous posts included less socializing; participants often pivoted separately from one type of post to another, producing less uptake and creating more unresolved tangles.

Previous research, grounded in the COI framework, investigated how online interactions foster social and cognitive "presence," and "engagement" among participants engaged in shared inquiry, despite the absence of face-to-face contact (e.g., Garrison & Arbaugh, 2007; Morueta et al., 2016). These studies disagreed about the value of synchronicity (Hrastinski, 2008; Molnar & Kearney, 2017; Martin et al., 2021). A more recent meta-analysis (Zeng & Luo, 2024) found that asynchronous learning (including, but not limited to online discussions) was more effective in promoting student knowledge than synchronous online learning, however, the effect was trivial in size. In addition, these studies compared asynchronous threaded discussions to synchronous linear chat discussions. Our study eliminated different formats by employing linear chat for both asynchronous and synchronous discussions. In our study, synchronous discussions featured more postings within dialogic spells, likely due to social bonds formed. These dialogic spells enabled collaborative development, refinement, and challenges to ideas, as well as overcoming obstacles to collaborative interpretation. This aligns with Wu and Ouyang (2024) who found regulation discourse in synchronous, but not in asynchronous, discussions and more students in the role of knowledge constructors in synchronous discussions.

Our study expands upon previous research. Our findings align with Hrastinski (2008): our synchronous discussions involved more upfront socializing, and longer discussions with shorter posts, while asynchronous discussions featured less socializing and longer, more intricate posts. However, our study with synchronous discussions featuring longer dialogic spells provides insight into discrepancies in subsequent research results, where synchronous discussions engendered greater cognitive presence (Kearney, 2017).

Martin et al.'s (2021) meta-analysis of synchronous versus asynchronous online learning, encompassing entire courses rather than discussions in isolation, revealed that synchronous online learning produced significantly more cognitive outcomes. In our study, participants in synchronous discussions pivoted together between topics, fostering longer dialogic spells and more tangles (and more tangle resolutions). When examining posts in isolation, asynchronous discussions lead to more complex individual thoughts, implying greater cognitive presence. When examining the coherence of whole discussions (our study), synchronous discussions emphasize social knowledge construction, perhaps yielding superior cognitive outcomes (Martin et al., 2021). Online discussion participation entails collaborative interaction that cannot be studied in isolation from other posts (Arvaja & Hamalainen, 2021, p. 2).

In our study, tangles occurred in both asynchronous and synchronous forums but were more frequent and more often resolved in synchronous discussions. Previous studies highlight the pitfalls of online asynchronous discussions (e.g., Gao, 2011), particularly in threaded discussion forums (Hewitt, 2005; Sherry, 2017). We posit that linear chat forums, while eliminating the isolating hierarchy of threaded forums, also gave rise to tangles. In synchronous discussions, social presence facilitates tangle resolution. We propose that instructors could leverage synchronous online discussions to foster social cohesion, enhance student uptake, and support dialogic discourse. Conversely, if instructors aim to achieve more uptake than in threaded discussions, while encouraging more formal elaboration of individual positions in response to discussion questions, asynchronous linear discussions may prove effective.

Some studies, focusing not on the discourse, but rather after discussion measures such as posttests (Riel et. al., 2022), found few differences between synchronous versus asynchronous discussions. However, we focused on the discourse of the discussions itself. Thus, our study suggests that synchronous and asynchronous discussions differ in character. Asynchronous discussions are more formal, with longer postings; synchronous discussions are more social, with longer conversations (or dialogic spells), more conversational tangles (interruptions of conversational topics), but also more resolution of tangles. Asynchronous discussions have long been the default in online courses. Certainly, many students may express themselves more comfortably in asynchronous environments, e.g., students with learning disabilities who comprehend more asynchronously (Dahlstrom-Hakki et al., 2020), second language speakers, and perhaps more introverted people. Instructors are well advised to consider their goals for online discussions and to decide whether to use synchronous or asynchronous discussions and linear chat discussions. However, given that student isolation is a potential problem in online courses, instructors should consider more frequent staging of synchronous discussions to promote longer educational conversations with more social connections between students.

Limitations

Although there were 711 postings in our study and 73 participants, the unit of analysis was discussions, of which there were 18. Thus, one limitation was clearly the sample size. Future studies might use larger sample sizes. Also, our online discussions comprised three to six students per group. Thus, our results may not generalize to larger-sized groups. For example, with full class discussions, synchronous text/chat discussions may take on a completely different character become unwieldy, and potentially lose some collaborative functionality. Further, full-class synchronous discussions may simply become unwieldy, because students and the instructor may not have enough attentional bandwidth to follow more than a couple of people posting synchronously at a time.

Since our study focused on linear chat discussions, its findings apply only partially to other online discussion formats, such as threaded discussions commonly found in Learning Management Systems like Canvas (Larson & Keiper, 2002; Sun & Gao, 2017), anchored discussions where students link posts to specific moments in a video (Gao, 2011), and webbed discussions where students connect their contributions to multiple other posts (Sherry, 2017). Our participants were master's students. Thus, results may differ with other age groups engaging. As Learning Management Systems become more prevalent in secondary education, further research might investigate online discussions among younger students. Additionally, due in part to the age and experience of the students, the discussions in this study were unmoderated. Moderation can either facilitate or hinder student participation (Correia & Baran, 2010; Rovai, 2007).

Our participants engaged in discussions related to a fictional text. The dynamics of synchronous and asynchronous discussions are likely to differ with non-fiction readings or in other academic disciplines. Previous studies have examined how face-to-face and online discussions vary by academic discipline (Parker, 2001; Sherry, 2016). Therefore, further research could investigate how synchronous and asynchronous discussions may be influenced by content, purpose, and academic discipline.

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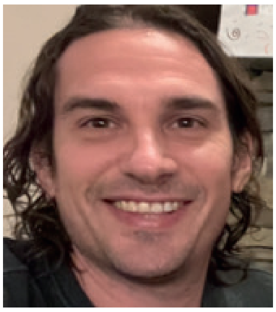

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APPENDICES

Appendix A. Coding dialogic spells, a screenshot of part of an Excel file of discussion data.

Pseudonym	Message	R1 Discussion type	R2 Discussion Type	R1 Dialogic spell	R2 Dialogic Spell
pim-11	It would hurt worse to know his death was my fault than to know that he was happy with someone else.	Imaginative entry	Imaginative entry	2	2
pim-11	I think I'd find it easier to move on and live if he was still alive.	Imaginative entry	Imaginative entry	2	2
pim-11	I mean there are other guys out there after all.	Seminar	Seminar	2	2
pim-12	I agree.	Seminar	Seminar	2	2
pim-12	Personally, I would save him.	Imaginative entry	Imaginative entry	2	2
pim-12	I'd rather be sad for a little while that the person I loved married someone else, than let them get killed.	Imaginative entry	Imaginative entry	2	2
pim-12	I would feel guilty for the rest of my life.	Imaginative entry	Imaginative entry	2	2
pim-12	And that's true!	Seminar	Seminar	2	2
pim-12	There are other guys out there so even if he was the most handsome and all that,	Seminar	Seminar	2	2
pim-12	I'm sure I would eventually get over him being with someone else	Imaginative entry	Imaginative entry	2	2
pim-12	I think if I misled him to choose the tiger's door, I would feel like I committed a murder myself	Imaginative entry	Imaginative entry	2	2
pim-11	I agree with that so much!	Seminar	Seminar	2	2
pim-11	But I'm not sure how this princess would think.	Seminar	Seminar	2	2
pim-11	Do we know how many people are part of this group?	Procedure	Procedure	3	3
pim-11	We can try to get in touch with them and decide how we wat to write out the answer	Procedure	Procedure	3	3
pim-12	I'm not sure!	Procedure	Procedure	3	3
pim-12	I tried looking for a "particpants" button or something and I couldn't find one.	UX	UX	3	3
pim-11	I couldn't either.	UX	UX	3	3
	I sent an email to the coordinator and I hope to hear back from them, but I wouldn't mind setting up a discussion in our				

Appendix B. Code book excerpt, showing discussion type

Term	Definition	Example
UX	User's opinions about the web-based eBooks system interface, or media they wish we would include, user experience, media, and relationship with the media.	*"I'm finding this program a bit slow and difficult to work in." "I am not a fan of the sound effect, but would be a fan of some pictures."*
Social	Discussion that establishes or maintains a relationship and does NOT relate to the assignments. For example, greetings.	*Hello! I'm excited to work with you all.*
Procedure	Discussion toward accomplishing a task. How should the task be accomplished? Specifically, a discussion of how to complete the assignment. Big Question: How does this work? What does the teacher want us to do with this assignment?	*Are we each supposed to submit our own interpretations or compose something together?* *Did we submit it? Is that why it's blank now?* *What time is everyone available to meet and complete the task?*
Deliberation	Turns related to decision-making about the content or writing or wording. For example, what should be included in a collaborative submission, and how it should be worded. The internal procedure of the group. Actionable.. This includes discussion about the interpersonal functioning of the group. Big Question: What should we do next?	*What do you think about the questions? How should they be answered?* *Nadina: In terms of just answering, I feel like the tiger was behind the door, and later the King puts his daughter to trial…* *Julie: That's exactly what I think as well.*
Seminar	Discussion on the meaning or interpretation of content. My interpretation vs. your interpretation. Big Question: What does it mean?	*Perhaps the content could mean* *this…* *I mean I think it states that the king does love the daughter at some point though. 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.*
Imaginative entry	Discourse that places the learner in the discussion as an active participant	*Does this mean that we are all like this too?*
Disciplinary	Application of shared field to discussion of content	*This relates to the content we* *reviewed at an earlier time.*
Other	Non-sequitur or anything that doesn't fit into any other category.	*s60e 6f 0y 2eys 6n3y d6 n40bers*