

Bringing New Literacies into the Secondary Classroom: A Case Study of Synchronous Collaborative Writing with Google Docs

Soobin Yim*

School of Education, University of California, Irvine, United States

Mark Warschauer

School of Education, University of California, Irvine, United States

Correspondence

Email: soobiny@uci.edu

Abstract

Despite the increasingly widespread adoption of collaborative technology in K-12 writing instruction, little is known about how these new literacy practices shape students' academic writing experiences with synchronous online collaboration, particularly within the context of long-term curricular integration. Addressing this gap, this study examines middle school students' in-class use of Google Docs for synchronous collaborative writing over the course of a year, exploring how technology reshapes learning experiences and opens new pathways for interaction and literacy practices as suggested by Chappelle (2007). Based on qualitative analyses of multiple data sources—including student and teacher interviews, student reflections, and observations, we examined the perceived affordances and challenges of these new literacy practices, as well as the contextual factors that influence students' collaborative experiences. Findings revealed several key benefits of synchronous academic writing, including enhanced writing fluidity, reflective verbal composing, and audience awareness, while also revealing challenges such as an overemphasis on efficiency, and tensions over textual ownership. We conclude by emphasizing the pedagogical implications of effectively integrating synchronous collaborative writing into secondary classrooms and beyond.

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¹Introduction

The synchronous features of cloud-based technology, such as simultaneous access, writing, and editing, have significantly expanded the possibilities for collaboration, reshaping how students develop and navigate literacy skills. Unlike traditional word processing programs, the cloud-based functionalities in Google Docs support many-to-many simultaneous writing, creating a dynamic and recursive writing experience (Kessler et al., 2012; Zhang et al., 2021). Given the imperative to equip students with 21st-century literacy skills, many K-12 schools are increasingly adopting cloud-based technologies for writing instruction. However, while substantial research has been conducted on asynchronous peer feedback practices (e.g., Carvalho & Santos, 2022; Zhan et al., 2023), few studies explore how adolescent students engage with new literacy practices such as face-to-face synchronous collaborative writing within the context of long-term curricular integration.

Since the effectiveness of technology heavily relies on how teachers utilize and incorporate the tool in classrooms (Grimes & Warschauer, 2010), further research is necessary to illustrate the students' and teachers' perceived experiences of synchronous collaboration, as well as the contextual elements that enhance its successful implementation. This study addresses this gap by examining U.S. middle school students' in-class synchronous collaborative writing with Google Docs over the course of an academic year. Through qualitative analyses of student and teacher interviews, reflection essays, open-ended surveys, and classroom observations, we highlight the perceived affordances and challenges of these new academic writing practices, as well as the contextual factors that shape their experiences. Ultimately, our findings aim to provide insights that could guide educators in thoughtfully integrating synchronous collaborative writing into their curricula, enhancing the learning environment while addressing the challenges identified in the study.

Literature Review

Integrating New Literacies into K-12 Classrooms

The extensive use of social technology in writing has radically changed the way students read, write, and interact (Storch, 2019; Pegrum et al., 2022). With these technological tools, the boundaries of literacy, traditionally defined as fixed skill sets of reading and writing, have expanded to include evolving discourse practices and communication processes (Dobson & Willinsky, 2009; Lankshear & Knobel, 2007). This transformation is central to New Literacies Studies (Lankshear & Knobel, 2007), which investigates perspective the novel types of literacy practices shaped by digital media (Gee, 2009). Building on the foundation of traditional literacy, new literacies encompass the knowledge, skills, and strategies necessary for effective communication and participation through technologies (Leu et al., 2004). In this regard, new literacies are characterized by

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increased interactivity, collaboration, and networked distribution (Coiro et al., 2014). Acknowledging the swift changes in literacy practices outside of school, many K-12 educators and researchers have aimed to integrate technology into writing classrooms to better equip students for these evolving literacy demands.

While concerns have been raised that the flexible and informal nature of new literacies might impede the development of academic skills in school, focusing exclusively on school literacies can undermine students' experiences. Neglecting the literacies they engage with outside the classroom may devalue the skills they have developed beyond traditional educational settings, potentially doing a disservice to many learners (Yi, 2007). This perspective aligns with the idea of culturally relevant pedagogy, which recognizes and sustains the dominant language, literacy practices, and other cultural elements familiar to learners (Ladson-Billings, 1995). Emerging digital cultures can offer support systems that assist students in enhancing fundamental literacy skills, such as reading and writing (Thorne & Black, 2007; Jenkins et al., 2009), bridging the gap between school-based and out-of-school literacy practices.

Research on new literacies in K-12 settings have focused on examining their participatory and collaborative affordances (Borup et al., 2021). For example, research has documented the benefits of online collaboration during group writing, such as enhancement in higher-order thinking skills (Zhan et al., 2023), metacognitive skills (Carvalho & Santos, 2022), learner engagement (Zhang & Liu, 2023) and participation opportunities for struggling writers (Zheng et al., 2015). However, most of the studies on online collaborative writing examined structured, asynchronous peer interaction practices revolving around wikis, blogs, or discussion boards. Compared to the literature that well-documented students' engagement with asynchronous feedback and peer review in K-12 classrooms (Loretto et al., 2016), studies on synchronous collaboration experiences are relatively lacking.

Synchronous Collaborative Writing

Research has shown that communication modes such as real-time capabilities affect group collaboration dynamics (Aubrey, 2022; Han & Li, 2020) and writing performance (Zhang & Liu, 2023). Synchronous technology, which involves *textuality* in asynchronous mode supported by *orality* in synchronous mode (see Guardado & Shi, 2007 for details on interaction modes), hold unique affordances for learner collaboration. Recent second language (L2) studies comparing the learner experiences during the different interaction modes suggested that synchronous collaboration promotes higher levels of engagement through real-time interaction and negotiation of meaning compared to asynchronous collaboration (e.g., Zhang & Zou, 2022). Specifically, Zhang and Liu (2023) reported that while asynchronous writing allowed for deeper reflection and revision, benefiting accuracy and structure, synchronous collaboration showed stronger immediate gains in fluency and idea generation due to real-time interaction. Participants of the study also

noted that synchronous tasks helped build a sense of community and more frequent practice opportunities for spontaneous and authentic language use, both of which are essential in language learning.

Among technologies leveraging synchronous features such as simultaneous editing and commenting, Google Docs is widely used in writing instruction to support group collaboration (Su & Zhu, 2020). Studies conducted primarily in post-secondary contexts have highlighted the benefits of integrating Google Docs for synchronous collaborative writing. For example, Abrams's (2019) study on second language learners' Google-Docs based collaborative writing found that groups with strong collaboration produced texts with better coherence and more propositional content, suggesting the link between collaboration patterns and textual quality. Similarly, Bikowski and Vithanage's (2016) study on ESL students' use of Google Docs in group contexts noted substantial gains in their writing competence, particularly in accuracy, content organization, and overall proficiency. Other studies have reported various factors influencing collaborative interaction in L2 settings, such as communication mode, task type, and language proficiency, offering insights into the design of effective collaborative tasks (Cho, 2017; Zhang et al., 2021).

While these studies reveal the specific affordances of synchronous collaboration in higher education or small-group language learning contexts (Cho et al., 2022), little is known about how emerging technologies like Google Docs function with younger, linguistically, and culturally diverse student populations in mainstream K-12 classroom settings. Moreover, compared to online (non-face-to-face) synchronous collaboration, few studies have examined face-to-face synchronous collaboration (Han & Li, 2020). Therefore, a significant gap remains in understanding its application in U.S. secondary classrooms, particularly for long-term implementations. The limited research on sustained use over an extended academic period makes school districts and educators hesitant to harness these technologies, as they lack comprehensive data on long-term engagement and the potential challenges of managing synchronous group work across an entire school year. This study seeks to address these uncertainties by examining synchronous collaborative writing experiences throughout an academic year in a secondary classroom.

Methods

Study Context

Data was collected from three 8th-grade English Language Arts (ELA) classes at a technology-supportive K-8 school in Southern California. This school features a linguistically and ethnically diverse student population, with White and Hispanic students each comprising 5.6%

This research involved 102 eighth graders across three focal ELA classes taught by the same teacher. At this one-to-one laptop school, 87.8% of students were already familiar

with using Google Docs for group writing, and 94% rated their tech skills as advanced or higher.. In this one-to-one laptop school, most students were familiar with group writing using Google Docs (87.8%) and had high technology proficiency (94% self-rated as advanced or above). At the beginning of the school year, students were randomly assigned into groups of four, and the same groups remained together throughout the year. As a group, they collaboratively wrote three academic essays of different genres (narrative, argumentative, and informative) during the academic year, once per trimester, with each essay spanning approximately two weeks. In the one-to-one laptop environment, all students worked synchronously on three writing tasks using Google Docs, engaging in real-time collaboration. This process involved both verbal and textual interactions, with students simultaneously contributing to the documents, offering feedback to one another through oral discussion or textual comments on Google Docs, and making revisions collectively. No specific instruction on collaboration or using Google Docs was provided; it was up to the students to collaboratively plan, write, and revise their group essays.

Data Sources

Over the course of the academic year, multiple sources of data were collected and triangulated to explore students' perceived experiences with synchronous collaborative writing. The main data sources included a total of six student interviews (N=16), three teacher interviews, open-ended survey responses, six classroom observations, and one-time end-of-year reflection essays, while supplementary data came from students' collaborative essays and transcribed group discussions. The selection of student interviewees was guided by recommendations from the teacher. Focal group interviews were conducted with four groups, six times in total: twice during and the rest completed after each of the three collaborative writing projects and followed by individual interviews. These semi-structured interviews provided insights into students' learning, writing, and synchronous collaboration experiences, including translated interviews in Korean for ELL students.

Retrospective text-based interviews conducted with focus groups after the collaborative writing projects were implemented to gain a deeper understanding of students' collaborative writing processes. During the stimulated recall, we identified specific sections of the group essay and queried the participants about the specific strategies they used during the writing process, any specific challenge they had, how they negotiated their ideas. Additionally, one-time end-of-year written reflections were collected from the participants to understand their overall perceptions toward synchronous collaboration and writing growth throughout the year. As a supplementary data source, the focal groups' verbal group discussions during the argumentative essay task were audio-recorded and transcribed to understand the process and strategy of students' group work. Classroom observations, coupled with class artifacts such as assignments

and lesson plans, further contextualized students' experiences during the collaborative writing projects.

Data Analysis

Inductive thematic analysis, supported by the constant comparative method (Glaser & Strauss, 1967; Saldana, 2009), was applied to analyze qualitative data from student and teacher interviews, reflections, and observations. This analysis was triangulated with supplementary data sources such as open-ended surveys, group writing artifacts, and verbal interactions. The coding process progressed from initial open coding to in-vivo and axial coding, identifying themes and relationships among categories related to students' collaborative interactions. In the final stage, theoretical coding illuminated the most relevant themes. Key-event analysis was also used to examine contextual factors influencing synchronous collaborative writing, uncovering key themes such as student frustration with limited participation and excitement about using Google Docs. These key events were compared within and across student groups to track changes in participation and perceptions over time.

Findings

The qualitative analysis of student and teacher interviews, reflections, and observations provided in-depth description of students' perceived affordances and challenges, as well as the contextual factors that shaped students' collaborative practices.

Perceived Affordances of Synchronous Collaborative Writing

Several aspects of synchronous collaborative writing were identified as contributing to enhancing both academic writing and broader 21st century literacy skills. Key themes include (1) fluidity in writing, (2) reflective revision, (3) heightened audience awareness, (4) diverse pathways for participation, (5) cultural relevance, and (6) college and career readiness.

Fluid Writing with "In-the-Moment Revision"

During interviews, both students and the teacher reflected on how collaborative writing using Google Docs supported a more iterative and dynamic approach to writing and revision. Unlike traditional group work, which often demands significant time and effort for logistical coordination, Google Docs' synchronous features greatly accelerated feedback, revision, and communication between writers and readers. The teacher highlighted that this real-time collaboration encouraged students to engage more deeply with the revision process, allowing them to refine their ideas and structure continuously due to the platform's easy-to-use editing features.

I think when I first started in a one-to-one school, the biggest change was just the amount of writing students produced...We could address revisions so much more efficiently. If it was an essay written in pen and I told them to fix this, this,

and this, then rewrite—it didn't get done. But now, revisions are immediate, efficient, and much more productive. I think it builds their confidence and levels the playing field, ensuring everyone has equal access.

Echoing the teacher's perspective, one student compared their synchronous collaboration experiences throughout the writing process to traditional individual writing or asynchronous peer review:

I had more [writing] opportunities with collaborative essays. We usually wrote stories alone, sometimes exchanging with a partner, but we'd only have five minutes to read and respond, which wasn't enough to really engage with their writing. With collaborative writing, everything is there, and you can build on it every time you log in and see what others are writing.

The student's comments underscore a key benefit of synchronous collaboration—the ongoing, between-draft revisions that occur “as you go.” In traditional peer reviews, students typically wait until the end of the writing process to engage in reflection, limiting the scope of revision. Studies on asynchronous collaborative writing similarly caution that students often only collaborate at specific stages, such as during the review process (Storch, 2002), resulting in more surface-level engagement and feedback. In contrast, the integration of synchronous technology in this study facilitated continual, in-the-moment revisions throughout the writing process, encouraging deeper engagement. Another student elaborated on this advantage:

It opens our eyes to other ideas and perspectives. Normally, when you're writing alone, it's just your thoughts. By the time you've finished the essay, most people don't want to edit it too much. But when you're all writing together, you're already sharing ideas, which helps make the story better and enhances it overall.

This perspective emphasizes how simultaneous access and group revisions in a synchronous environment promote more sustained collaboration throughout the entire writing process. Such an approach provides more opportunities to explore diverse perspectives during the planning or drafting stage. This helps writers engage with the fluidity of texts, which can “function as resources for expansion, reconfiguration, and new synthesis” (Lund, 2008, p. 50).

Reflective Verbal Composing with “Four Minds”

Students also highlighted how collaborative dialogue during synchronous writing sessions encouraged reflective and critical thinking throughout the writing process. They noted that verbal discussions about their text both at the sentence and text level fostered open-mindedness toward diverse perspectives. This dual mode of collaboration, involving both textual and verbal elements, specifically helped with ideation and critical

thinking. One student reflected on her experience working with what she described as “four minds” in her group:

I think we write much better because we build off of each other's ideas, and working together really helps me focus on what the task is. Instead of having one mind working, we have four minds working on it, which makes us think about the topic critically... and from different perspectives.

Additionally, several students emphasized the verbal articulation of ideas helped students with reviewing the content and logic of their text. One student explained: “You actually verbally talk while you are writing and you are also thinking about what you are going to write.” This method of verbal composing provided students with multiple benefits, including an enhanced understanding of vocabulary, topic interpretation, and revision strategies. One group described how they meticulously crafted and revised their writing through continuous discussion and reflection:

We discussed everything. We wrote the story per sentence and revised it over and over. After finishing a paragraph, we read it and discussed how we could improve it. It was time-consuming, but I learned a lot about how to write a sentence... which word to use... how to revise, and how to think about the topic.

In the following segment of a group discussion, the members openly discussed how to compose a sentence, seeking mutual agreement on each one. The members engaged in direct editing throughout the group composition process, expanding and elaborating on each other's ideas. S1 and S2 actively contributed suggestions for revisions (lines 2 and 3), and were supported by S3 and S4, who incorporated these suggestions and revised the text (lines 4 and 6).

S3: What about the next sentence... [highlighting on Google Doc] Do you think it connects well with our topic sentence?

S2: No, it sounds like...a jump. [deleting the sentence highlighted by S3] I wish we add something or repeat the idea somehow.. I don't know... You know what I mean?

S1: Good point. What if we add 'History shows us..'

S4: I like that. We can say 'History has shown us time and time again.. [adding to S1's text]

S2: Then we can add the examples we talked about.

S3: Got it. Let me type that in...

Student reflections also suggested that the verbal articulation of ideas during composition, combined with textual collaboration, encouraged metacognitive processes. As a result, students became more attuned to the logic and coherence of their texts,

reflecting deeper levels of critical thinking. This observation aligns with studies suggesting the facilitating role of real-time collaboration in promoting higher-order thinking skills and deeper engagement in the writing process (Carvalho & Santos, 2022).

Shared Writing that Engages the “Built-in Audience”

Students reflected that synchronous collaboration cultivated a higher level of reader awareness and accountability during writing. In the next excerpt, one student discussed how her attitude toward writing as a boring school assignment has changed due to the constant presence of “built-in audience” on Google Docs.

Usually I just think that it’s a school assignment so I just do what I’m supposed to do. When it’s a school assignment I usually don’t really think a lot about the reader. Most times it’s just, “Oh, my teacher is going to read this,” and it’s boring. But in collaborative writing, I think I try to make my writing better because other people are going to read it. So I want to make sure that they can understand my writing.

During interviews, students also discussed how the shared responsibility that they developed during group work affected their motivation for writing. In the next two excerpts, students mentioned that the sense of community motivated them to be accountable.

Personally, I like working in groups better even in other parts not associated with writing so I really like collaborative writing. For one it’s motivating. When you’re by yourself you think, “Oh man I have to get this whole thing done by myself”, but when you are with four other people you can share the responsibility, and it feels like we are all in this together.

The teacher also echoed this point, explaining that group works can be more engaging for students because of a built-in audience and accountability.

I think it does make them more engaged because they are working closely with peers and it kind of makes a built-in audience, a built-in accountability because you have a team counting on you.

Such reflections align with previous studies highlighting the benefits of collaborative writing in enhancing student motivation and responsibility through peer interaction and shared goals (Storch, 2005; Bikowski & Vithanage, 2016). This shared responsibility and sense of community help students view their writing as a dialogue, moving beyond basic task completion to purposeful, audience-centered writing.

Diverse Participation Pathways with “Simultaneous Branching”

The dual modes of participation—in-text collaboration supported by verbal discussion—also diversified how members could contribute. For some, verbal participation was viewed as significant as their written contributions. As one student explained, *“If they are talking a lot in the discussion and adding more ideas, I think they are really participating and helping others know what to write about.”* While lower-proficiency writers may not contribute as much textually as higher-proficiency writers, they still have multiple opportunities to participate throughout the writing process, such as during topic brainstorming, planning, and organizing ideas.

Such wider range of participation options was especially motivating for quieter students or those less confident in their writing abilities, as it provided them with various ways to engage and make meaningful contributions to the group effort. One student explained how the real-time commenting feature of Google Docs facilitated communication within her generally quiet group with several low-proficient writers: *“Even though we might not talk often, we pitch in comments on Google Docs, comment on each other, revise other people’s individual paragraphs. That was very helpful because if we did that on paper, I don’t know how you’d get to where we are now.”*

Simultaneous editing across different sections also allowed students to expand on each other’s texts in real-time through what one student referred to as the *“simultaneous branching”* of ideas. This approach was perceived particularly beneficial at the macro level of writing, especially in terms of improving how evidence is integrated and how claims are substantiated throughout the text. With the ease of simultaneous group editing on Google Docs, students were able to focus on the larger structural elements, such as the coherence of arguments and the depth of support provided. Regarding this, one student noted: *“Because you can see what you’re typing, and sometimes you can just add on to that. Most of them are adding more contextual evidence to make your main idea clearer.”* The distributed control in simultaneous editing can promote the equalization of participation, which is one of the most significant and beneficial outcomes of technology-integrated writing (Warschauer, 1997). Such aspects help students view writing not as static or final products but as dynamic resources for expansion, reconfiguration, and reinterpretation (Lund, 2008).

Cultural Relevance: “The Way We Read and Write”

Students also reflected that synchronous collaborative writing was culturally relevant to the literacy practices they were accustomed to in out-of-school contexts. For example, one student expressed feeling disconnected and disengaged when writing on paper, contrasting this with how collaborative writing using Google Docs resonated with *“the way we read and write.”*

The way we read and write... I guess we grow up doing things a certain way. I feel like writing is about people contributing to it. Writing on paper was a lot harder for me because I'm just not used to it. When revising, I had to erase everything, and if I wanted to add more, there wasn't enough space. I'd end up erasing and rewriting everything to make room.

Another student highlighted how the new writing practices mirrored aspects of her out-of-school literacy activities on social media. These activities included exchanging feedback, maintaining a strong reader presence, and collaboratively creating content.

On social media, there's a wide variety of people you can comment to. I also read and write on WattPad—it's a reading and writing app for the iPhone or laptop. People write stories, and you can write your own stories too. I'm used to getting feedback and building stories together.

Incorporating the simultaneous and social aspects into in-class academic writing helps bridge the gap between academic and out-of-school literacies, enabling students to engage in familiar, authentic ways of writing. Research supports that students' cultural and linguistic practices that ground their everyday lives need to be integrated into classroom instruction and meaningfully valued (Thorne & Black, 2007; Gutierrez & Rogoff, 2012). This includes acknowledging their dominant language and diverse cultural practices that shape their identities. This approach can not only validate their existing literacy practices but also enhance their participation, motivation, and sense of ownership over their learning.

College and Career readiness: "Getting an Early Experience"

Besides the benefits for writing development, synchronous collaborative writing was also recognized as an important tool for preparing students for college and future careers. The real-time nature of this collaboration mirrors the fast-paced, interconnected environments of many modern workplaces, where employees are often required to engage with team members remotely and simultaneously. Students appreciated the opportunity to gain "an early experience" with online collaboration that they believed would be integral to their future careers. One student reflected on how the integration of technology into collaborative work mimics the demands of modern workplaces:

I think you have to collaborate with others in real jobs. Like your communication with others has to be on point and I think your group members also have to be aware of that. They need to also communicate with you to create a whole writing. If they don't understand or they don't do the right topic, you'll fail in real jobs, too.

The following teacher excerpt also illustrates how collaborative writing in the classroom serves as an apprenticeship for workforce skills:

I would imagine in schools that don't have the one-to-one [laptop program] at hand, they'd probably use Google Docs even more because the whole point of that is you can collaborate wherever you are, you don't have to sit next to each other. I think there are still people that think they need books in their hands, but when they get into the workforce they will be using technology and collaborate.

Such focus on early exposure to professional skills reflects growing recognition of the value of career-ready education. Research supports this idea, indicating that early engagement in collaborative work not only builds necessary communication and technical skills but also boosts students' confidence in their ability to transition into higher education and the workforce (Alvarez-Huerta, 2021). Through these experiences, students can develop a range of competencies that are increasingly demanded in today's digital and collaborative professional environments.

Perceived Challenges of Synchronous Collaborative Writing

Despite the multiple benefits of synchronous collaborative writing, several challenges of synchronous collaboration were also identified. These challenges were particularly pronounced among less collaborative focal group, but similar concerns were observed even among students who evaluated their collaboration experience positively overall. The primary challenges included: (1) undue focus on efficiency at the expense of quality, (2) tension over textual ownership, and (3) time management challenges that hindered deeper collaboration.

Efficiency over Quality: "A Quick, Efficient Sentence"

Several students prioritized efficiency over quality, defining collaboration as a way to quickly finish tasks by splitting the work. This often resulted in a pattern of separate writing, with cooperation limited to dividing the tasks in the form of "divide and conquer." During an interview, one student discussed the benefits of synchronous collaborative writing, emphasizing how it made the job "easier" by "killing two birds with one stone."

You're all editing while you're writing, so it's kind of like killing two birds with one stone. In collaborative writing, we all follow the same pattern—like the intro, body paragraphs, and then the conclusion—but with a collaborative essay, you're writing the whole thing together, and it's kind of easier. You wouldn't have to write the intro all by yourself. You would only have to focus on one body paragraph, which helps you put better content into that paragraph.

The student perceived that simultaneous group editing would reduce the amount of work, rather than produce better work through negotiation and the co-construction of knowledge. Trentin (2009) identified a similar issue, noting that members tend to limit their focus to their part of the topic in the final collaborative work. This can also pose a challenge to teachers, as it becomes difficult to determine how thoroughly each member engages with the overall project, aside from completing their designated tasks. The following interview excerpt illustrates this point, highlighting that focusing on efficiency often compromises the quality of the work:

It encourages me to write fast—a quick, efficient sentence as others are doing. Maybe it was good that we were able to work efficiently, but the bad thing was we weren't able to actually do some of the things.

The student's approach reveals a common misconception in collaborative work, where the focus shifts towards efficiency over quality. In this case, synchronous collaboration is viewed as a way to reduce the workload by dividing tasks, rather than as an opportunity to co-construct knowledge and produce a higher-quality outcome through negotiation and feedback. This mindset is evident in the student's limited engagement with other members' contributions, reviewing or providing feedback only when time allowed. As Trentin (2009) points out, this division of labor can lead to a narrow focus, where individuals concentrate solely on their assigned portions, potentially undermining the coherence and depth of the final product. As the student acknowledged in his comment, the group text produced efficiently may lack substance, which calls for the need for a more balanced approach that values both efficiency and quality in collaborative writing.

Tension over Collective Ownership: "The Power to Change"

Another challenge perceived was the tension over textual ownership. Students felt disturbed about not having control over the group document, indicating a strong sense of individual ownership. For example, in the following excerpt, one student discussed her frustration with lacking control over document access and editing permissions in Google Docs.

Some suggestions that I would make is about the powers that people in the document have. If a certain person isn't the owner of the document, then they shouldn't have the power to change the accessibility of other members. This caused great disruption in the group writing. And sometimes someone deletes what I wrote on accident. So it would be helpful if there's an option to select certain text, and click a button so someone can't delete it. Not so like someone can't erase anything you've written, but you can select certain text not to be deleted.

Additionally, a decreased sense of ownership over the group text can result in diminished individual accountability and an over-reliance on peers who may assist in editing the text at the same time. The following student comments illustrate such examples of this: *“If there’s like not a good word in my text, someone can correct it and put a better word for me,”* and *“I hardly have anything to edit [because of other members’ help].”*

Such tendency echoes Caspi and Blau’s (2011) earlier caution that collaboration and ownership have trade-off relationships. For instance, increased individual ownership of group texts may diminish students’ sense of accountability for the overall document. However, as the excerpt illustrates, strong individual ownership can lead to conflict when students feel a lack of control over the shared document, resulting in frustration and disruptions in the collaborative process.

Time Constraints: “Writing such a Small Part”

In a non-collaborative group, students expressed frustration with how managing group dynamics consumed much of their available time, limiting their ability to focus on essential tasks like writing and meaningful discussion. One student highlighted how time pressure hindered collaboration, saying, *“I like that we can bounce ideas off each other, but sometimes you spend so much time bouncing ideas that you end up not writing at all.”* Another student echoed this concern, noting, *“We don’t discuss the subject much, but if we spend too long discussing, it sets us behind on writing.”*

Students also mentioned that a lack of time during the final review stage can weaken the text’s quality, particularly its organization. Many felt rushed after completing the first draft, leaving insufficient time to review for coherence. One student described the difficulty of maintaining coherence when using synchronous tools that allow simultaneous contributions from all group members: *“The organization gets worse because everyone is writing everywhere at the same time.”* The teacher shared a similar concern, emphasizing the need to strengthen the organizational aspect of group texts, as some groups often spend too much time during planning and ideation, which leads them to rush the revision stage due to time constraints:

The weak area in group texts is organization. I need to build in more accountability for the revision process. My idea was that you would revise, rearrange, delete, and reorganize. Some did this to a degree, but not enough—by the time we got there, we were in a time crunch.

Previous studies on collaborative writing noted that when too much time is devoted to managing group interactions, the actual work suffers, leading to inefficiency and frustration within the group (Kaufman et al., 2000). This suggests the need for more structured instructional arrangements where groups are guided to allocate sufficient time for each stage of writing, ensuring that students have enough time for revision. Clear

guidelines on how to allocate time across the writing process will help students enhance their time management skills, which are crucial for effective collaboration.

Implementation Contexts

The affordances and challenges of synchronous collaborative writing should be interpreted within the implementation contexts, as they are heavily influenced by the instructor's approach, accompanying curriculum, and the broader institutional culture. Teacher and student interviews, written reflections, along with classroom observations, revealed several key factors that shaped students' collaborative experiences, demonstrating that success in such environments depends not only on the participants but also on external conditions. Notably, the following contextual elements were identified as crucial: (1) the district-level initiative for technology integration, (2) the school's emphasis on collaboration and diversity, and (3) the teacher's curriculum integration efforts.

District-level initiative for technology integration.

In this study, the participating classes were part of a district that actively supported technology integration. The district was in the process of actively rolling out one-to-one laptop programs in all schools, and the school examined in this study was one of the leading schools with a strong technology initiative. In the following excerpt, the teacher discussed the sufficient training and support available at the district, noting the district's one-to-one laptop program initiative as effective.

There is a ton of training on that so that is where the focus is right now. I don't feel like I'm lacking in training. We do have TOSA (Teachers on Special Assignments); they're tech specialists. They are always sending out messages saying they are here to help and they are from the district. I can say, "I'm teaching language arts and I'm not feeling very innovative these days, come and show me something." I think this is why our district has had such a successful program.

Such comments echo studies suggesting that suitable multimedia equipment and communication tools are basic prerequisites for collaborative online learning (Hron & Friedrich, 2003). In her ELA classes, she integrated Google Docs as core writing platforms, and has used a variety of other technology programs that also involve a collaborative nature. The use of multiple programs to support group writing projects proved beneficial for students, as it helped them become familiar with collaborative learning across different areas of literacy, such as vocabulary, reading, and writing. The teacher further discussed that her experiments with these technology tools in her classes were well-received by the students, who also have high levels of technology proficiency. In the following excerpt, one student who transferred from another school appreciated the technology-supportive learning environment that the school provided.

The other school I went to, we didn't use any technology, so it was mostly just pen and paper. In [this school], I think we learn what we are supposed to learn and above that. Our school focuses on technology, especially with Google Docs. I think they use Google Docs since the second grade. We don't necessarily write a lot, but we have so much available writing and resources to use such as going online and practicing.

Teachers' feelings of empowerment are important indicators in determining the degree of effectiveness in the integration of instructional technology (Henriksen et al., 2019). In the teacher's case, the district-wide initiative for technology integration enabled her to explore new instructional tools, adapt digital resources to meet diverse student needs, and experiment with different pedagogical strategies that leverage technology in meaningful ways.

School's Emphasis on Collaboration and Real-World Application

The school's commitment to enhancing collaboration and real-world application also facilitated students' collaboration practices in ELA classes. As highlighted in the following excerpt, the teacher explained that the school's overall instructional approach prioritized knowledge development and 21-century workforce skills over traditional knowledge delivery.

Well, I think it [the school] definitely emphasizes collaboration and real-world application. I love this idea that we talked about a lot, the classroom walls are kind of torn down because it's 24/7 learning. It's not this do this assignment, turn it in, then I'm done. It's kind of this ongoing build-up of skills, connections, and applications. We ask, "What are they going to bring to this community as a learner?"

Under such emphasis, multimedia projects—such as digital storytelling—were promoted in the participating classes as an extension of synchronous collaborative writing. During interviews, one student reflected on the similarities and differences between the collaborative academic essays and the digital storytelling projects. In the following excerpt, he outlines his unique roles in each project and how the writing component of video making process mirrored the collaborative academic essay. These synergistic connections helped him recognize the different roles and unique contributions in collaborative writing.

I think the group put me to my best abilities— scriptwriter, cameraman, and editing. So I'm pretty good with editing and I can write decently. So I wrote the script and edited because the actors were a little bit heavier. But I can't just sit there, write and edit. So I was a little bit of a cameraman. I guess you can say I kind of led there. That's just because that person didn't want to be an actor and

he didn't have a lot of experience. So I was more like his tutor than a leader. In a sense, it was similar to the collaborative essays, in that I sometimes edit, write, tutor, and lead.. working with others.. In the end they both just came down to be editing and we finish it off and add final touches.

The process of combining different roles and responsibilities in multimedia projects reflects how students also navigate and manage collaborative academic tasks, fostering skills essential for modern academic and professional contexts. Additionally, this role assignment helps students understand the multifaceted nature of the writing process by highlighting how various stages, from research to editing to presentation, each contribute to creating a cohesive final product.

The Teacher's Strategic Curriculum Design

In the ELA classes, the teacher deliberately integrated collaborative writing projects as post-reading activities, following intensive reading and discussion. She designed these projects to include multiple tasks across different genres, allowing students the opportunity to work collaboratively, revise their work individually, and be assessed on both group and individual efforts. This thoughtful instructional planning reflected her belief in the social aspects of literacy and her goal to foster teamwork and a sense of accomplishment as key instructional outcomes.

Rather than treating collaborative tasks as isolated exploratory activities, the teacher provided students with numerous opportunities to engage in collaborative processes across various genres. One student, in the excerpt below, reflected on how her group grew more comfortable and effective as they progressed through navigating the different genres:

I really think it was a smart idea to start with the narrative because that is the one that is more open to opinions and different ideas. So because of that, we were able to outwardly say, 'This is what I want,' and we all worked together. Eventually, as we got into other things like argumentative and informative, we were already kind of used to being criticized about our ideas. And we're more aware of each other's personal side.

The teacher ensured that students were well-prepared for group writing by scaffolding the tasks, which was key to meaningful engagement. Prior to each collaborative writing project, which served as the culminating task for each unit, students read between nine and twelve texts related to the unit's theme. These reading lessons were followed by a series of pre-writing activities, including answering comprehension questions and analyzing exemplary texts. Students were then required to use these readings as evidence in their collaborative writing. The teacher highlighted the importance of scaffolding tasks and building background knowledge for effective collaboration but allowed students

flexibility in how they approached planning and writing, as described in the following excerpt:

I would say they have enough background knowledge that they can bring something to the project. The pre-writing was to look at a mentor's text and analyze the introduction and body. I made them do the prewriting on Google Docs so everyone could see each other's analysis of the type of writing we were going to do. There was a model text that served as an example of the type of story they were supposed to write.

Finally, the teacher emphasized the importance of balancing collaborative and individual work. After completing the group project, students revised their group product individually, and the teacher evaluated the refined individual essays for grades. One student appreciated this assessment structure, as shown in her comments:

I think collaborative writing really helps, but I also think there should be an independent aspect to it. I liked that after we wrote the story together, we had the chance to work on it independently because that's what made it better for each of us personally.

This balance is echoed by Elola and Oskoz (2010), who argue that collaborative writing should complement, rather than replace, individual writing in the classroom. In their study, students' individual writing skills benefited from in-class, web-based collaborative writing, which further developed their abilities through both group and solo efforts. A similar blended approach was noted in Zhang and Liu's research (2023), which suggested combining the real-time interaction of synchronous tasks with the reflective depth of individual writing or asynchronous peer review. This integration of collaborative and individual writing strategies can provide enhanced learning opportunities by leveraging the strengths of both approaches.

Discussion

This study investigated the experiences and perceptions of secondary students regarding the integration of synchronous collaborative writing practices into the curriculum over the course of one academic year. The affordances, challenges, and contextual implications identified in this study point to several implications for teaching and task design. First, effective task design at the classroom level is necessary to encourage deep engagement rather than mere task completion focused on efficiency. Instructional strategies to address these challenges may involve providing structured opportunities for revision and allocating specific time for each stage of the writing process, particularly for reflection and reorganization. Second, cultivating a balanced sense of textual ownership in group writing tasks is crucial, where individual accountability and collective effort coexist. One effective strategy is to have collaborative writing sessions precede individual

writing, as seen in the teacher's case. This approach allows writers to improve and revise the group text individually, fostering a sense of authorial ownership and mitigating feelings of disadvantage associated with group assessments. Educators could implement a structured rubric that evaluates both individual contributions and the group's overall effectiveness, incorporating peer evaluations. This multi-faceted assessment approach not only reinforces individual accountability but also emphasizes the value of teamwork in writing.

Next, a strategic approach to task sequencing is vital for effective collaborative writing. Given the time students need for effective collaboration, including building group rapport, long-term implementation may be conducive to providing sufficient time. Establishing clear group norms, expectations, and processes should precede collaboration to avoid conflicts and enhance students' group coordination skills. Another strategy is scaffolding writing tasks by organizing genres in a way that gradually builds students' collaboration skills and dynamics. As demonstrated in this study, starting with simpler genres, such as personal narratives, helps students develop their voice and style while also building rapport before advancing to more complex forms such as argumentative essays or research papers. Lastly, designing group writing tasks that leverage the strengths of both synchronous and asynchronous collaboration modes can help address the challenges of time constraints in synchronous collaboration. An added component of asynchronous peer reviews, followed by synchronous collaboration during planning and drafting, may enable students to engage more reflectively with the text at their own pace without feeling rushed.

The contextual factors identified in this study also highlight the importance of school and district and school at a broader institutional level. This study has shown that effective technology integration requires coordinated support across multiple levels—district, school, and classroom. Specifically, district initiatives that offer comprehensive resources and targeted professional development play a vital role in empowering educators. When these initiatives are complemented by a school-wide emphasis on collaboration and the application of technology in real-world contexts, they create an environment conducive to the effective curricular integration of synchronous collaborative writing. This multi-level approach not only enhances the teaching and learning experience but also ensures that technology integration is woven into the fabric of educational practices. Rather than functioning as an isolated initiative, such integration becomes part of a broader, sustained effort that engages all stakeholders, ultimately leading to more meaningful and impactful educational outcomes.

Conclusion

This study contributes to the growing body of research on new literacies by providing a detailed account of how synchronous collaborative writing practices unfold over the course of an academic year in secondary classrooms, highlighting their relevance to

students' academic literacy and broader 21st-century skills. The findings suggest that incorporating synchronous collaborative writing, supported by institutional initiatives, can foster a fluid, iterative writing process that encourages reflective verbal composing and stronger audience awareness. Students also perceived that it can provide diverse participation pathways, enhances cultural relevance, and prepares students for college and careers. However, notable challenges, including an undue focus on efficiency over quality, tensions regarding textual ownership, and time constraints, underscore the necessity for careful pedagogical planning. This study also emphasizes the importance of contextual factors such as school and district-wide technology initiatives, as well as the teacher's role in effectively integrating collaboration into the curriculum. Future research could build on these qualitative findings by exploring how to refine task design and curriculum for synchronous collaborative writing, as well as identifying the impact of specific factors on collaboration and writing development. Effective instructional strategies, cultural relevance, and thoughtful pedagogical design are essential for ensuring that technology enhances rather than replaces traditional teaching methods (Chapelle, 2009; Chapelle & Sauro, 2017). By aligning instructional efforts with the evolving demands of literacy education, teachers in diverse K-12 settings can leverage technology effectively to empower student writers while preserving the depth and rigor of traditional pedagogical practices.

ORCID

 <https://orcid.org/0000-0003-2567-1452>

 <https://orcid.org/0000-0002-6817-4416>

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Soobin Yim: Writing – Original Draft, Writing-Review & Editing, Project Administration, Investigation, Methodology, Investigation, Formal Analysis, Data Curation, Conceptualization, Data Curation, Visualization

Mark Warschauer: Writing – Review & Editing, Formal Analysis, Resources, Conceptualization, Supervision

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Generative AI tools were used in the later stages of writing for grammatical refinement, improved flow, and paraphrasing for clarity. ChatGPT (OpenAI, 2025) and Gemini (Google, 2025) were used with prompt keywords related to language-level editing (e.g., proofread, paraphrase, improve clarity and explain your changes). All conceptualization, data analysis, coding decisions, interpretations, and all sections involving original scholarly argumentation were completed entirely by the authors. No AI-generated content replaced human judgment, theoretical framing, or analytic reasoning. All AI-assisted revisions were reviewed, verified, and further edited by the authors to ensure accuracy, fidelity to the data, and alignment with the study's methodological and ethical commitments. No AI tools were used to analyze data, generate codes, produce results, or create figures, tables, or images.

Ethics Declarations

World Medical Association (WMA) Declaration of Helsinki–Ethical Principles for Medical Research Involving Human Participants

This study was conducted in accordance with the ethical standards outlined in the Declaration of Helsinki. All procedures involving human participants were approved by the Institutional Review Board of the University of California, Irvine. Informed consent was obtained from all participants, and all data were anonymized to protect participant confidentiality.

Competing Interests

The authors declare no competing interests.

Data Availability

Due to the nature of qualitative research and to protect participant confidentiality, the data including interview transcripts and observations are not publicly available. De-identified data can be provided upon reasonable request to the corresponding author.

References

- Abrams, Z. I. (2019). The effects of integrated writing on linguistic complexity in L2 writing and task-complexity. *System, 81*, 110–121. <https://doi.org/10.1016/j.system.2019.01.009>
- Alvarez-Huerta, P., Muela, A., & Larrea, I. (2021). Student engagement and creative confidence beliefs in higher education. *Thinking Skills and Creativity, 40*, Article 100821. <https://doi.org/10.1016/j.tsc.2021.100821>

- Aubrey, S. (2022). Dynamic engagement in second language computer-mediated collaborative writing tasks: Does communication mode matter? *Studies in Second Language Learning and Teaching*, 12(1), 59–86. <https://doi.org/10.14746/ssl.2022.12.1.4>
- Bikowski, D., & Vithanage, R. (2016). Effects of web-based collaborative writing on individual L2 writing development. *Language Learning & Technology*, 20(1), 79–99. <https://doi.org/10.4324/9781003037736-18>
- Borup, J., Walters, S., & Stimson, R. (2021). Examining peer-to-peer supports in K–12 blended academic communities of engagement. In C. R. Graham (Ed.), *Blended learning* (pp. 214–230). Routledge. <https://doi.org/10.4324/9781003037736-18>
- Carvalho, A. R., & Santos, C. (2022). Developing peer mentors' collaborative and metacognitive skills with a technology-enhanced peer learning program. *Computers and Education Open*, 3, 100070. <https://doi.org/10.1016/j.caeo.2021.100070>
- Chapelle, C. A. (2007). Technology and second language acquisition. *Annual Review of Applied Linguistics*, 27, 98–114. <https://doi.org/10.1017/S0267190508070050>
- Chapelle, C. A. (2009). The relationship between second language acquisition theory and computer-assisted language learning. *The Modern Language Journal*, 93(s1), 741–753. <https://doi.org/10.1111/j.1540-4781.2009.00970.x>
- Chapelle, C.A., & Sauro, S. (2017). Introduction to the handbook of technology and second language teaching and learning. In C. Chapelle & S. Sauro (Eds.), *The handbook of technology and second language teaching and learning* (pp. 1–9). Wiley. <https://doi.org/10.1002/9781118914069.ch1>
- Caspi, A., & Blau, I. (2011). Collaboration and psychological ownership: How does the tension between the two influence perceived learning? *Social Psychology of Education*, 14, 283–298. <https://doi.org/10.1007/s11218-010-9141-z>
- Cho, H. (2017). Synchronous web-based collaborative writing: Factors mediating interaction among second-language writers. *Journal of Second Language Writing*, 36, 37–51. <https://doi.org/10.1016/j.jslw.2017.05.013>
- Cho, H., Kim, Y., & Park, S. (2022). Comparing students' responses to synchronous written corrective feedback during individual and collaborative writing tasks. *Language Awareness*, 31(1), 1–20. <https://doi.org/10.1080/09658416.2021.1937194>
- Coiro, J., Knobel, M., Lankshear, C., & Leu, D. J. (2014). Central issues in new literacies and new literacies research. In J. Coiro, M. Knobel, C. Lankshear, & D. J. Leu (Eds.), *Handbook of research on new literacies* (pp. 1–22). Routledge. <https://doi.org/10.4324/9781410618894-7>
- Dobson, T., & Willinsky, J. (2009). Digital literacy. In D. R. Olson & N. Torrance (Eds.), *The Cambridge handbook of literacy* (pp. 286–312). Cambridge University Press. <https://doi.org/10.1017/cbo9780511609664.017>
- Elola, I., & Oskoz, A. (2010). Collaborative writing: Fostering foreign language and writing conventions development. *Language Learning & Technology*, 14(3), 51–71. <http://dx.doi.org/10125/44226>
- Gee, J. P. (2009). Deep learning properties of good digital games: How far can they go? In U. Ritterfeld, M. Cody, & P. Vorderer (Eds.), *Serious games: Mechanisms and effects* (pp. 67–82). Routledge. <https://doi.org/10.4324/9780203891650-15>
- Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory: Strategies for qualitative inquiry*. Aldine. <https://doi.org/10.4324/9780203793206-1>
- Grimes, D., & Warschauer, M. (2010). Utility in a fallible tool: A multi-site case study of automated writing evaluation. *The Journal of Technology, Learning and Assessment*, 8(6). Retrieved from <https://ejournals.bc.edu/index.php/jtla/article/view/1625>
- Guardado, M., & Shi, L. (2007). ESL students' experiences of online peer feedback. *Computers and Composition*, 24(4), 443–461. <https://doi.org/10.1016/j.compcom.2007.03.002>
- Gutiérrez, K. D., & Rogoff, B. (2012). Cultural ways of learning. In *Knowledge, values, and educational policy* (pp. 114–125). Routledge. <https://doi.org/10.4324/9780203378595-17>
- Han, M., & Li, Y. (2020). The effect of face-to-face and non-face-to-face synchronously collaborative writing environment on student engagement and academic performance. *Journal of Education, Innovation and Communication*, 1(2), 65–74. <https://doi.org/10.34097/jEICOM-volume-1-issue-2-december-2019-5>
- Henriksen, D., Mehta, R., & Rosenberg, J. (2019). Supporting a creatively focused technology fluent mindset among educators: Survey results from a five-year inquiry into teachers' confidence in using technology. *Journal of Technology and Teacher Education*, 27(1), 63–95.
- Hron, A., & Friedrich, H. F. (2003). A review of web-based collaborative learning: factors beyond technology. *Journal of Computer Assisted Learning*, 19(1), 70–79. <https://doi.org/10.1046/j.0266-4909.2002.00007.x>

- Jenkins, H., Purushotma, R., Weigel, M., Clinton, K., & Robison, A. J. (2009). *Confronting the challenges of participatory culture: Media education for the 21st century*. MIT Press. <https://doi.org/10.17077/etd.7mrxri65>
- Kaufman, D. B., Felder, R. M., & Fuller, H. (2000). Accounting for individual effort in cooperative learning teams. *Journal of Engineering Education*, 89(2), 133–140. <https://doi.org/10.1002/j.2168-9830.2000.tb00507.x>
- Kessler, G., Bikowski, D., & Boggs, J. (2012). Collaborative writing among second language learners in academic web-based projects. *Language Learning & Technology*, 16(1), 91–109. <http://dx.doi.org/10.125/44276>
- Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal*, 32(3), 465–491. <https://doi.org/10.2307/1163320>
- Lankshear, C., & Knobel, M. (2007). Sampling “the new” in new literacies. In M. Knobel & C. Lankshear (Eds.), *A new literacies sampler* (Vol. 29, pp. 1–24).
- Leu, D. J., Kinzer, C. K., Coiro, J. L., & Cammack, D. W. (2004). Toward a theory of new literacies emerging from the Internet and other information and communication technologies. *Theoretical Models and Processes of Reading*, 5(1), 1570–1613. <https://doi.org/10.1598/0872075028.54>
- Loretto, A., DeMartino, S., & Godley, A. (2016). Secondary students’ perceptions of peer review of writing. *Research in the Teaching of English*, 51(2), 134–161. <https://doi.org/10.58680/rte201628872>
- Lund, A. (2008). Wikis: A collective approach to language production. *ReCALL*, 20(1), 35–54. <https://doi.org/10.1017/s0958344008000414>
- Pegrum, M., Hockly, N., & Dudeney, G. (2022). *Digital literacies*. Routledge. <https://doi.org/10.4324/9781003262541>
- Saldana, J. (2009). An introduction to codes and coding. In *The coding manual for qualitative researchers* (pp. 1–31). SAGE Publications.
- Storch, N. (2002). Relationships formed in dyadic interaction and opportunity for learning. *International Journal of Educational Research*, 37(3), 305–322. [https://doi.org/10.1016/s0883-0355\(03\)00007-7](https://doi.org/10.1016/s0883-0355(03)00007-7)
- Storch, N. (2005). Collaborative writing: Product, process, and students’ reflections. *Journal of Second Language Writing*, 14(3), 153–173. <https://doi.org/10.1016/j.jslw.2005.05.002>
- Storch, N. (2019). Collaborative writing. *Language Teaching*, 52(1), 40–59. <https://doi.org/10.1017/s0261444818000320>
- Su, F., & Zou, D. (2020). Technology-enhanced collaborative language learning: Theoretical foundations, technologies, and implications. *Computer Assisted Language Learning*, 1(1), 1–35. <https://doi.org/10.1080/09588221.2020.1831545>
- Thorne, S. L., & Black, R. W. (2007). Language and literacy development in computer-mediated contexts and communities. *Annual Review of Applied Linguistics*, 27, 133–160. <https://doi.org/10.1017/s0267190508070074>
- Trentin, G. (2009). Using a wiki to evaluate individual contribution to a collaborative learning project. *Journal of Computer Assisted Learning*, 25(1), 43–55. <https://doi.org/10.1111/j.1365-2729.2008.00276.x>
- Warschauer, M. (1997). Computer-mediated collaborative learning: Theory and practice. *The Modern Language Journal*, 81(4), 470–481. <https://doi.org/10.2307/328890>
- Yi, Y. (2007). Engaging literacy: A biliterate student’s composing practices beyond school. *Journal of Second Language Writing*, 16(1), 23–39. <https://doi.org/10.1016/j.jslw.2007.03.001>
- Zhan, Y., Yan, Z., Wan, Z. H., Wang, X., Zeng, Y., Yang, M., & Yang, L. (2023). Effects of online peer assessment on higher-order thinking: A meta-analysis. *British Journal of Educational Technology*, 54(4), 817–835. <https://doi.org/10.1111/bjet.13310>
- Zhang, M., & Liu, Q. (2023). Synchronous and asynchronous online collaborative writing: A study on Chinese language learners. *Foreign Language Annals*, 56(3), 740–763. <https://doi.org/10.1111/flan.12704>
- Zhang, M., Gibbons, J., & Li, M. (2021). Computer-mediated collaborative writing in L2 classrooms: A systematic review. *Journal of Second Language Writing*, 54, Article 100854. <https://doi.org/10.1016/j.jslw.2021.100854>
- Zhang, R., & Zou, D. (2022). Types, features, and effectiveness of technologies in collaborative writing for second language learning. *Computer Assisted Language Learning*, 35(9), 2391–2422. <https://doi.org/10.1080/09588221.2021.1880441>
- Zheng, B., Lawrence, J. F., Warschauer, M., & Lin, C.-H. (2015). Middle school students’ writing and feedback in a cloud-based classroom environment. *Technology, Knowledge and Learning*, 20, 201–229. <https://doi.org/10.1007/s10758-014-9239-z>