In-Class or Out-Of-Class? Unveiling Factors Influencing EFL Learners' Dynamic Interaction in MALL-Based Collaborative Writing

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Abstract: Mobile assisted language learning (MALL) has facilitated language learning across time and space. Previous studies have found that students show different learning behaviors and interactions in different writing contexts, but few studies have explored how these contexts influenced learners' interactions in MALL-based collaborative writing. This case study investigated how context-related factors mediated interaction patterns between two groups (n=6) of Chinese secondary EFL learners as they engaged in MALL-based collaborative writing in both in-class and out-of-class contexts. Data were collected from multiple sources, including questionnaires, online writing and discussion records, reflection papers, and semi-structured interviews. Adopting Storch's (2002) model of "equality" and "mutuality," this study found that both groups demonstrated a facilitator/collaborative pattern during Task One. However, in Task Two, Group One changed to a collaborative pattern, while Group Two shifted to a cooperative/withdrawn pattern. Drawing upon the expanded activity model, the analysis revealed six factors that shaped students' interaction dynamics across contexts: goals, roles, emotional engagement, collaborative writing strategies, team management, and technological affordances. These findings deepen our understanding of how writing contexts influence group collaboration and offer both theoretical and empirical insights into how MALL-based collaborative writing can be designed and facilitated in second language (L2) education.

Keywords: Collaborative writing, activity theory, mobile learning, in-class writing, out-of-class writing

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1. Introduction

Collaborative writing, co-authoring texts involving two or more people throughout the writing process, has been used as a pedagogical approach to facilitate knowledge co-construction and promote learner autonomy and creativity (Storch, 2002). Collaborative writing has received much attention in second and foreign language teaching because it helps generate high-quality written products through collective scaffolding (Li & Zhu, 2017; Montanero et al., 2026; Salo et al., 2023) and benefits individual students' writing skills via collaborative dialogues (Cho, 2017; Yeh, 2014).

Recent developments in mobile technology have revolutionized teaching and learning methods. Mobile Assisted Language Learning (MALL), defined as "language learning facilitated by learners' mobility and portability of mobile devices", has supported collaborative writing by complementing, improving, and adding new collaborative features to L2 classrooms (Wang, 2023; Zhang & Zou, 2022). MALL-based collaborative writing is valued for pooling linguistic resources, promoting students' interactions, and stimulating language acquisition regardless of time and space constraints (Jones et al., 2017). Nevertheless, MALL-based environment can hardly guarantee collaborative work and high-quality performance (Jiang & Zhang, 2020). Existing research has documented problems in MALL-based collaborative writing, including unwillingness to collaborate, feelings of isolation and disconnection, and a preference for individual work (Aghajani & Adloo, 2018; Oaxaca, 2025). Studies investigating interactions in collaborative writing have begun to explore factors that mediate students' engagement (Cho, 2017; Lai, 2015; Li & Zhu, 2017), contributing to collaborative writing by highlighting its benefits and addressing its limitations.

However, current research has mainly focused on learners' collaborative writing experiences within schools (Storch, 2017), and limited research has explored how changes in writing contexts influence students' interactions in collaborative writing. "While research considers how mobile technologies may act as a bridge between formal and informal language learning" (Kukulska-Hulme, 2015, p.285), a persistent narrow emphasis on traditional learning settings is inconsistent with how students learn across different social settings (Kukulska-Hulme & Sheild, 2008). Bridging the in-class and out-of-class learning, therefore, is perceived as an important challenge in academic research and teaching practices (Hung et al., 2012). Considering that learning happens in various social contexts and that collaborative writing is context-dependent, it is imperative to explore how learners collaborate in MALL-based collaborative writing across different writing contexts.

This study aims to further explore how different writing contexts influence peer interactions when Chinese secondary EFL students engaged in MALL-based collaborative writing. By identifying learners' dynamic interaction patterns across

different contexts and the sociocultural factors mediating these patterns, this study extends theoretical models of peer interaction and offers practical implications for optimizing MALL-based collaborative writing. The study has two research questions:

1. How does interaction pattern change when students wrote across the in-class and out-of-class writing contexts?
2. How are students' interaction patterns affected by context-related factors?

1.1 Group interaction in collaborative writing

Collaborative writing, in which two or more individuals co-author one document throughout the writing process (Storch, 2002), has attracted much attention in language teaching in the past two decades. Research has shown multiple benefits of collaborative writing, ranging from enhancing students' audience awareness (Montanero et al., 2026; Or-kan, 2018) and improving critical thinking (Cho, 2017), to jointly reviewing the emerging composition and applying newly acquired knowledge (Oskoz & Elola, 2016; Salo et al., 2023) .

To further promote the effectiveness of collaborative writing, numerous studies have examined interaction patterns in the writing process (Cho, 2017; Li & Zhu, 2017), referring to how learners discuss writing tasks and collaboratively construct negotiated meanings (Li, 2013). Building upon Damon and Phelps' (1989) concepts of mutuality (level of interaction with a peer's input) and equality (level of control in a task), Storch (2002) analyzed both the word count and communicative language functions in writing and identified four interaction patterns when ESL university students wrote collaboratively face-to-face: collaborative, dominant/dominant, dominant/passive, and expert/novice (see Figure 1). In Quadrant One, both mutuality and equality are high. This is called the collaborative pattern, in which group members contribute collaboratively and engage actively during writing. In Quadrant Two, although equality is high, mutuality is low, so it is called dominant/dominant pattern. This pattern is characterized by learners' high degree of disagreement and individual contributions. Both mutuality and equality are low in Quadrant Three. This pattern, referred to as dominant/passive, occurs when the task is dominated by one member, while others remain disengaged. Quadrant Four, representing low equality but high mutuality, is referred to as expert/novice pattern. In this pattern, the leading member behaves like an expert or tutor, encouraging the novice to engage in writing.

Other researchers have extended this model of interaction patterns to online settings. Drawing on Storch (2002)'s framework, Li (2013) analyzed the language functions, writing change functions, and scaffolding utilized in participants' wiki discussions and writings, and found three distinct patterns: authoritative/responsive, collectively contributing, and dominant/withdrawn. She further claimed that teams showed "collective scaffolding" established a positive

learning environment that benefited participants' learning. Abrams (2016) asked eight small groups to collaboratively write an ending for a German film in Google Docs. After analyzing participants' writing changes, three main patterns emerged: sequentially additive, collaborative, and passive/passive, with the former two being more collaborative.

Previous research on peer interaction shed light on the dynamic nature of interaction patterns (Cho, 2017; Li & Zhu, 2017; Storch, 2002). However, limited research has examined the contributing factors behind different interaction patterns during collaborative writing. Meanwhile, scholars hypothesized the relationship between interaction patterns and students' performance (Abrams, 2019). Therefore, researchers have called for studies to explore the possible contributing factors that mediate students' different interaction patterns during collaborative writing (Abrams, 2016; Lai & Lei, 2016; Storch, 2017).

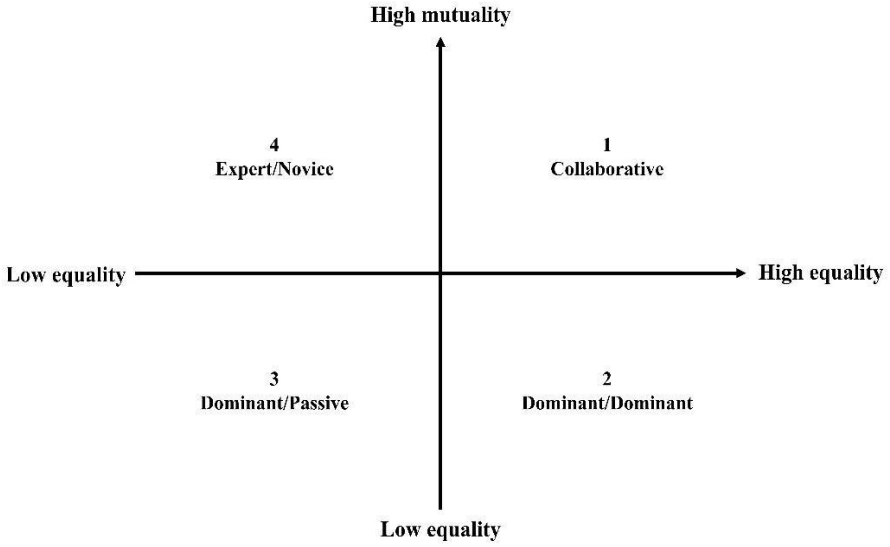


Figure 1: The model of interaction patterns (Storch, 2002)

1.2 Mobile assisted language learning

MALL, originated from computer assisted language learning (CALL), quickly attracted researchers because of its distinctive characteristics of the "anytime, anywhere principle" (Kukulska-Hulme & Shield, 2008). MALL encompasses not only the portability of devices, but also the flexibility of time, place, and personalized learning experience. Therefore, different from traditional classroom language learning experiences, MALL offers a flexible and self-directed opportunity for language learners to utilize enhanced mobility and engage in seamless language learning across time and space. Learners can use mobile technologies to acquire

knowledge, communicate with others, and access valuable language resources through a network. Moreover, language learning experiences can be integrated and transferred across different learning contexts using mobile technologies, making learning possible both inside and outside the classroom (Lai, 2015).

Previous research has also shown that mobile technologies supported collaborative writing in multiple ways. For instance, students can collaboratively write, edit, and respond to one another's writing outside the traditional face-to-face classroom (Li, 2013). Mobile devices also provide different online spaces where students can engage in social construction and shared ownership (Jiang & Zhang, 2020; Jones et al., 2017). Current studies suggest that MALL has bridged the gap between traditional classroom and out-of-class language learning, but there remains limited research regarding how different learning contexts might affect MALL-based learning opportunities.

1.3 Activity theory

This study is guided by Vygotsky's (1978) activity theory . It posits that a subject's actions aimed at achieving an objective are influenced by material or symbolic tools. Leont'ev (1981) extended this theory by distinguishing individual behaviors and collective activities. Therefore, activity theory focused more on culturally constructed needs within collective human activity, identifying three levels of socially influenced activities: motive, action, and conditions. To fully comprehend individual activity, Leont'ev (1981) emphasizes the importance to understand the context (the activity system) of those actions.

Engestrum (2015) develops the expanded model of activity theory, building on Vygotsky's triangle of mediating means and Leont'ev's concept of collective activity. This model (Figure 2) integrates the collective components of community, rules, and division of labor, while still emphasizing learners' interpersonal interactions in the system. In the community (individuals sharing a common object), tasks are distributed (division of labor), and rules regulate the interactions and actions of individual subjects. The components in the activity system reconstruct themselves by reciprocally and dynamically interacting with each other. Thus, this expanded triangle clarifies the interactive components in the activity system to represent the interrelated actions.

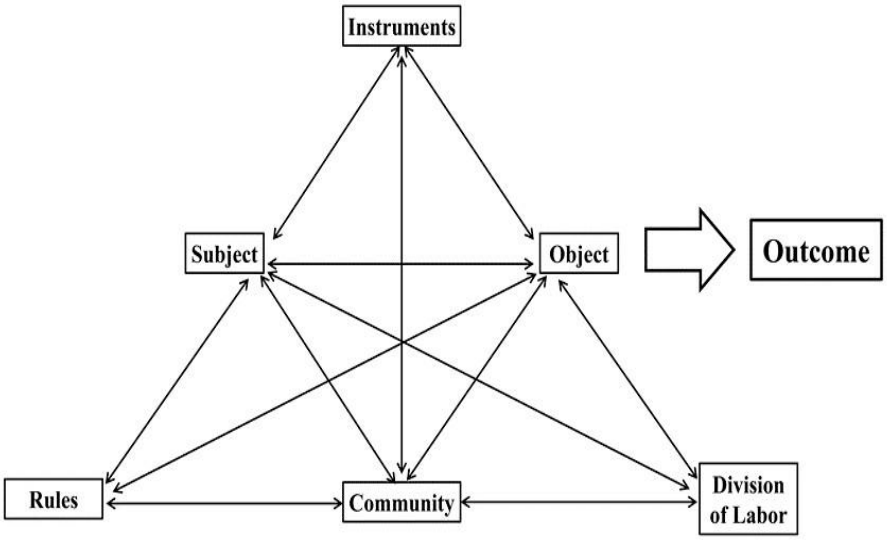


Figure 2: Activity model (Engestrum, 2015)

1.4 In-class and out-of-class collaborative writing

L2 learning research has categorized students' educational settings into in-class and out-of-class contexts. These two contexts have led to notable differences in the process of collaborative writing.

Specifically, the in-class context generally refers to learning in formal language classes, where collaborative writing is conducted according to classroom regulations (Jones et al., 2017; Kukulska-Hulme, 2015). Most studies in this field argue that in-class collaborative writing substantially enhance L2 learners' language acquisition and few studies identified factors affecting students' interaction. For instance, adopting activity theory, Storch (2002) illustrates that students' goals and motives were key factors influencing the interaction patterns. Aufa and Storch (2020) posited that peer interaction was influenced by face-to-face or online communication modes.

Unlike the in-class context, the out-of-class include learner-initiated activities beyond formal instruction, where language learning happens in informal, self-directed settings (Kukulska-Hulme, 2009; Trinder, 2017). Studies have revealed that technology-enhanced collaborative writing in out-of-class settings is crucial for providing authentic learning experiences, sustaining learner motivation, and contributing to language learning outcomes (Cho, 2017; Li & Zhu, 2017). Few studies investigated mediating factors to students' interaction patterns. Specifically, Cho

(2017) identified key contributing factors to students' effective interaction, including task presentation, roles, and modes of communication.

However, current research generally examined either in-class or out-of-class contributing factors in isolation, which conflicts with learners' language acquisition across different social contexts due to technological affordances (Oskoz & Elola, 2016). Acknowledging that learning is across different resources and distributed across different contexts, van Lier (2004) posits that learning is an interactive and active process that requires learners to perceive and make use of affordances in different learning contexts. Connecting in-school and out-of-school learning was regarded as a crucial focus in educational research and practices, so researchers (Hsu, 2020; Zhang & Zou, 2022) are calling for more studies to explore what learners are going through inside and outside class to promote prosperous and synergetic language learning experiences. This study bridges the gap by examining how writing contexts influence students' dynamic interaction across the in-class and out-of-class MALL-based collaborative writing. It further aims to offer both theoretical insights and practical implications for designing collaborative writing tasks that satisfy learners' cognitive, social, and affective needs.

2. Methodology

2.1 Participants and context

This study used a qualitative case study approach (Duff, 2018; Merriam, 1998) to examine and interpret students' interactions as well as their ShiMo Docs (similar to Google Docs) for English collaborative writing at a mid-sized secondary school in Southwestern China. This English writing course was designed to develop students' academic writing abilities, helping them prepare for the critical College Entrance Examination. This course was a two-credit online elective course for second-grade learners and required students to study for two class periods per week in the second semester. The students enrolled in this class were all native Chinese speakers who learnt English as a foreign language (EFL) for over five years. Enrollment of this course required students to have successfully completed the previous English writing course in Semester One with a score of "B" or higher. Therefore, this ensured students' intermediate-low English language level as suggested by the course curriculum.

Participation in this study was entirely voluntary, and students were assured it would not influence course grades. At the beginning of the semester, 24 out of 56 secondary students were willing to participate in this study. Two groups (six students) were selected for in-depth analysis based on purposeful sampling (Miles & Huberman, 1994), aimed at capturing a distinctive and dynamic interaction patterns across two writing contexts. Specifically, we selected two focal groups based on variations in English language proficiency, gender composition, and

students' willingness to engage in follow-up interviews questionnaires, and reflection papers, to ensure that the focal groups were information-rich cases. Although both groups completed the same writing tasks, they showed different interaction patterns across the two writing contexts. Each participants' profile (see Table 1) in this study was collected through pre-task questionnaires (see Appendix A). These questionnaires included items measuring students' English proficiency, mobile use and attitudes.

Table 1. Participants' demographic information

	Name	Gender	English Proficiency	Mobile Use	Attitude to Groupwork
Group 1	Yu	Male	Intermediate-high	Neutral	Positive
	Liu	Female	Intermediate	Comfortable	Neutral
	Dong	Female	Intermediate	Comfortable	Positive
Group 2	Gao	Male	Intermediate	Comfortable	Positive
	Huang	Female	Intermediate	Neutral	Positive
	Chang	Female	Intermediate-high	Comfortable	Neutral

Due to the unstable and slow connection of Google Docs in China, students used iPads to write on a domestic writing platform similar to Google Docs, ShiMo Docs (http://www.shimo.im). This tool offers real-time collaborative editing and commenting, automatic recording of writing history, thus facilitating collaborative writing and manual analysis. Figure 3 shows a screenshot of ShiMo Docs, where the editing records are shown in Area 1, the discussion records in Area 2, and the comment records in Area 3.

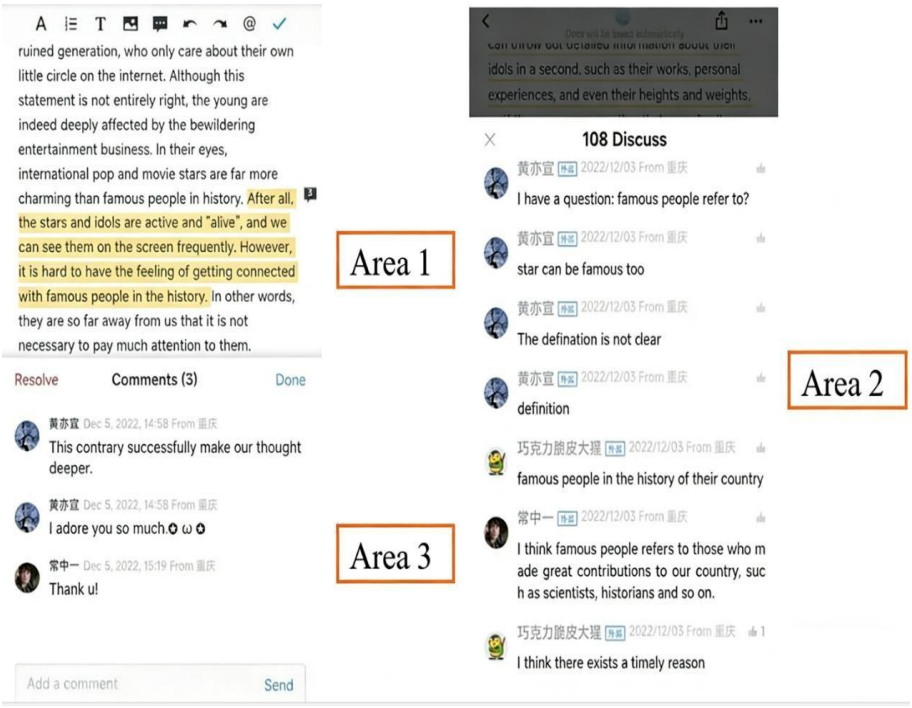


Figure 3: Screenshot of ShiMo Docs

The students needed to draft two argumentative writings (see Table 2) using ShiMo Docs either inside or outside class. These tasks were designed to enhance students' critical thinking abilities and essay writing skills. The EFL learners were assigned into groups of three, since this group size was proven to be most successful in previous studies (Abrams, 2016; Li & Zhu, 2013). The students initially selected group members and then the teacher also made minor changes to reduce the language differences between groups, and to foster cooperation abilities and scaffolding opportunities (Su et al., 2022). After groups were formed, a team leader was chosen by the students themselves to effectively manage their teamwork and organize writing activities. In this study, the same leader was retained across two writing tasks

in each group. This decision was supported by pedagogical considerations and previous research highlighting the advantages of stable leadership in collaborative writing (Li, 2013; Li & Zhu, 2017). Participants were motivated to use different features of ShiMo Docs to ensure collaborative writing occurred throughout the entire writing process. In the planning phase, participants used the "Discussion" module in ShiMo Docs to share thoughts, brainstorm ideas, and negotiate essay structures . During the drafting phase, participants co-constructed texts directly on the ShiMo platform, and used "Discussion" and "Comment" modules to clarify ideas and give peer feedback. In the revision phase, participants collaboratively edited and revised texts using "Discussion", "Comment", and "History" modules. Students were encouraged to collaboratively construct high-quality writings instead of merely completing a task. When students wrote inside the class, the instructor guided their writing strategies, facilitated the writing process, and answered questions if necessary, whereas the teacher was not actively involved in the out-of-class setting.

Table 2. ShiMo Docs Writing Tasks

Task Instructions	Topic
Write an argumentative essay in the in-class context	Why do contemporary parents impose significant pressure on their children, and does this trend have a positive or negative impact on them?
Write an argumentative essay in the out-of-class context	Why do young people today know more about international celebrities than historical figures from their own country, and how can we boost their interest in historical figures?

2.2 Data collection

The MALL-based collaborative writing lasted for ten weeks. We recruited participants from the writing course and provided ShiMo Docs training during the first two weeks. The instructor trained students collaborative writing strategies, including single-author sequential writing, reactive writing, parallel writing, and mix-mode writing (Horton & Rogers, 1991). The participants were required to fill in a pre-task questionnaire on demographic details, goals, language learning and mobile-device using experiences. During Week 3-4, participants collaboratively completed an argumentative writing via ShiMo Docs in class, while in Week 5-6, they composed a similar essay outside class. The first author retrieved and analyzed the writing records from the "Discussion", "History", and "Comment" modules. In Week 7-8, when students finished their collaborative writing, the instructor held interviews with students to understand their perceptions of writing experience. In Week 9, each student was invited to complete a reflection paper about their roles and individual/group members' contributions during writing. In Week 9-10, the teacher graded the groups' essays and evaluated their performance. Then, the first

author invited students to participate in member checking to verify the identified interaction pattern, ensuring the validity of qualitative data. In this study, we examined two focal groups through an in-depth analysis of their interactions and the related sociocultural factors that mediated them, providing a thick description in qualitative studies (Lincoln & Guba, 1985).The two groups also enabled cross-group comparison to promote validity in this study.

2.3 Data analysis

To address the research questions, we used triangulated data sources, including questionnaires, interviews, reflection papers, drafts, comments, and editing records. With regard to Research Question One about interaction patterns, we analyzed data using Storch's (2002) interaction model based on "equality" and "mutuality". In this study, "equality" describes the degree to which each individual contributes to the task and exerts control over the direction of the writing.; "mutuality" describes the extent of the response to one another's contributions during the process, including the degree of reciprocal responses in task discussion and engagement in others' texts in joint co-constructing (Storch, 2002; Li & Zhu, 2017). "Mutuality" and "equality" were reflected through participants' involvement observed in the "Discussion" and "Comments" modules, as well as the writing history shown in the "History" modules in ShiMo Docs .

As Table 3 shows, equality was analyzed by examining language functions (Storch, 2002) and writing change functions (Li & Zhu, 2017). Language functions mean the mediating functions of language, which indicate group members' interaction and contribution to the discussion, such as eliciting, agreeing, disagreeing, questioning and stating, etc. Writing change functions mean the writing or revision behaviors in groups' jointly written products, reflecting individual members' written contributions. We examined each group's ShiMo discussion records for language functions and the writing history for writing change functions. Balanced contributions indicated high equality, while significant imbalances reflected low equality.

To analyze mutuality, we examined participants' writing and discussion records, distinguishing between initiating vs. responding language functions and self vs. other writing change functions (see Table 3). High mutuality shows high mutual engagement, represented by a high ratio of responding functions and other functions, while a high ratio of initiating change and self change indicated low mutuality.

Table 3. Analysis of equality & mutuality in this study

Dimension	Definition
Equality	Each student's language function frequencies and their writing change function frequencies
Mutuality	*Initiating* language functions compared to *responding* language functions frequencies and self writing change function compared to *other* writing change function frequencies

In response to Research Question Two, instead of applying pre-set categories, we read and re-read students' interviews, reflection papers, and ShiMo discussion records and coded them using emerging keywords. Themes emerged as we continuously compared the coded labels and identifying the salient categories (Lincoln & Guba, 1985). After repetitive readings and analyses, we derived the following influencing factors: goals, agency and emotion, roles, team management, technological affordances, and the agreed-upon collaborative writing strategies that each group adopted to produce a jointly written text successfully (Ede & Lunsford, 1992). Then, these themes were linked to sociocultural factors, including object, subject, instrument, division of labor, community, and rules (Engestrum, 2015). These components and their dynamic influence on learner activities provide theoretical insights to classify these themes and further explore the influence of context on students' interactions. Finally, interviews and reflection papers were iteratively analyzed to identify instances of mediating factors.

To guarantee the reliability of data analysis, two trained coders independently coded the data sources, which included both the language functions and writing change functions. The inter-coder agreement between two coders reached 91.2% for language functions and 92.3% for writing change functions. At the sub-category level, inter-coder agreement ranged from 88.5% to 93.6% across all language functions, and from 89.7% to 94.1% across all writing change functions. Detailed agreement ratios for each sub-category is shown in Appendix D. When discrepancies occurred, the coders had a thorough discussion to clarify coding definitions and resolve disagreements. In accordance with established practices in qualitative studies (Miles & Huberman, 1994; Lincoln & Guba, 1985), if immediate agreement was not possible, a third independent coder was consulted to review the disagreement and make a final decision.

3. Results

Regarding Research Question One, Group One showed a facilitator/collaborative pattern when writing inside the class, and switched to a collaborative pattern when writing outside the class; Group Two also showed a facilitator/collaborative pattern in the in-class writing, but changed to a cooperative/withdrawn pattern in Task Two. The interaction patterns were measured by the degree of "equality" and "mutuality" (Li & Zhu, 2017). They are reflected in idea exchanges through language

functions and co-writing through writing change functions. Below I discuss interaction patterns of each group, focusing on group dynamics across tasks.

3.1 Group one

Group One demonstrated a facilitator/collaborative pattern in the in-class context. This pattern showed relatively high equality and high mutuality, similar to expert/novice and collaborative patterns. Although Gao took on a facilitator role and guided the task, all participants actively and evenly participated in the discussion and writing stages. In the out-of-class context, the interaction pattern changed to a collaborative pattern, with all members increasingly motivated and enthusiastic about working together.

Table 4 illustrates the characteristics of Group One's dynamic interaction. It demonstrates that in the in-class context, Group One members showed moderately high equality with a fair contribution in task discussion (with 26, 21, and 17 language function units) and joint writing (with 13, 7 and 9 instances of writing changes). Group One exhibited high mutuality showing a high response rate of 37 out of the 64 language functions and 19 *other* writing changes. For example, as indicated in Table 3, Gao successfully mediated group disagreements; group members collectively refined the text, adjusted the logic, and improved grammar. Similarly, both equality and mutuality sustained and even increased when Group One co-constructed in the out-of-class context. Group members communicated more frequently in the second task (with 27, 29, and 26 language function instances) and had a more balanced contribution (with 15, 15, and 11 acts of writing change function). As reflected in Table 5, three members collaboratively clarified the ambiguous definition and built on each other's contributions.

Table 4. Language and writing change functions of Group 1

	In-class				Out-of-class			
Function instance	Gao	Huang	Chang	All	Gao	Huang	Chang	All
Language	26	21	17	64	27	29	26	82
Initiating	12	10	5	27	9	12	11	32
Responding	14	11	12	37	18	17	15	50
Writing change	13	7	9	29	15	15	11	41
Self	5	3	2	10	5	8	4	17
Other	8	4	7	19	10	7	7	24

Table 5. Discussion and writing examples of Group 1

	In-class	Out-of-class
Language functions	Huang: Our first argument is that it will lower the education quality of universities, the second is the effect on society, and the third is the influence on students. (stating) Chang: In fact, we can combine the influence on society and students together because student is a member of society and can be reflected by the society. (suggesting) Gao: I think we can first state our disagreement in the beginning, and stated the support society and universities have already provided. In this way, the disagreement can be reflected in the two sides of the society and universities. (suggesting, justifying) Huang: Okay. Good suggestion! (agreeing)	Huang: I have a question: famous people refer to? Star can be famous too. The definition is not clear. (questioning, stating) Gao: famous people in the history of their country. (stating) Chang: I think famous people refers to those who made great contributions to our country, such as scientist, historians and so on. (suggesting) Gao: They lived in a past time, that nowadays young people cannot feel their great. (stating) Huang: I got the meaning timely. Now I understand. Thank you! (stating, acknowledging)
Writing change functions	Gao: Too much pressure, which asks them to lower the standards for students in need, may burden their shoulders, leading to a decrease in teaching quality. Chang: Because of this, too much pressure, which asks them to lower the standards for students in need, may burden their shoulders, leading to a decrease in teaching quality. (adding) Huang: Maybe they are not enough, however, too much pressure, which asks universities to lower the standards students in need, may burden their shoulders, lead to a decrease in teaching quality. (correcting, rephrasing)	Huang: It isn't a fault to admire a pop star, but the heroes' stories are worth inheriting. Gao: It isn't a fault to admire a pop star, or keep less information of a famous people in history. However, these heroes, whose stories and achievements past through a life long time proving correct and is worth inheriting. (adding) Chang: Although it isn't a fault to admire a pop star, who may also be a positive model of the youth, it is true that the stories and achievements of these admirable heroes that pass through a lifelong time are worth learning and inheriting. (adding, deleting, reordering)

3.2 Group two

Group Two members showed a facilitator/collaborative pattern in the in-class writing context. This pattern indicates that one member, Yu, took on a facilitating role, coordinated collaborative activities, and contributed more to the discussion and revision, while the other two participants also actively contributed to planning, drafting, and revising the text. This pattern reflects high mutuality, as group members responded to and built on each other's ideas. It also reflect relatively high equality, as they shared responsibility for completing the joint writing. Surprisingly, when working in the out-of-class context, they switched to a cooperative/withdrawn pattern, in which Liu and Dong cooperatively finished the task, while the selected leader, Yu, showed a significant decline in participation and ironically withdrew.

Table 6 highlights the dynamic interaction of Group Two. In Task One, the participants contributed relatively equally to task discussion (with 29, 23, and 18 language function acts) and task co-construction (with 10, 7, and 8 writing changes). Besides, this group showed high mutuality, indicated by a high response rate (44 out of 70 language functions and 13 other writing changes). As Table 7 indicates, Yu proposed the initial reason and elicited group members' ideas, and other members actively contributed their ideas; group members also engaged in multiple rounds of text revisions. By contrast, Group Two's interaction declined dramatically in the out-of-class context, exhibiting a cooperative/withdrawn pattern involving both low equality and mutuality. As shown in Table 6, participants showed limited interaction (exhibiting 5, 37, and 28 language function acts, with only 22 responding acts). The discussion was mainly between Liu and Dong, while the other member, Yu, seldom participated and eventually withdrew, leading to a notable decrease in interaction and a significant imbalance in contributions. As to mutuality, a low ratio of responding acts (4 out of 13) was found in the text co-construction. As Table 7 shows, although Liu attempted to elicit others' opinion, her ideas were not positively responded to by other members.

Table 6. Language and writing change functions of Group 2

	In-class				Out-of-class			
Function instance	Yu	Liu	Dong	All	Yu	Liu	Dong	All
Language	29	23	18	70	5	37	28	70
Initiating	11	7	8	26	5	23	20	48
Responding	18	16	10	44	0	14	8	22
Writing change	10	7	8	25	1	5	7	13
Self	5	4	3	12	1	5	3	9
Other	5	3	5	13	0	0	4	4

Table 7. Discussion and writing examples of Group 2

	In-class	Out-of-class
Language functions	Yu: Let's discuss the reasons. (Initiating) The first reason that parents put so much pressure on their children is because of the mentality of comparison. Chinese parents likes to compare their child with others, right? (eliciting) Liu: Another reason might be parents put their own unfulfilled dreams on their child. (responding). Yu: Right. Then do you think it's a good or bad phenomenon? (eliciting) Dong: I think the original wish is good, but if the demands is too high or the requirement is too much, it's another story. (stating) Liu: Agree. (agreeing)	Liu: 1. Social media users are young. 2. For the stars, thy put more efforts on exposing themselves than scientists. (stating) Liu: And they are easily obsessed with their gorgeous faces, right? (elaborating, eliciting) Liu: 3. and scientists' research fields are hard to understand. (stating)
Writing change functions	Liu: Students do something wrong and cannot be corrected, this would do harm to students' academic performance in the long run. Dong: What is regard as the worst is that when students do something wrong and cannot be corrected, this would do harm to their academic performance in the long run. (adding) Liu: Students do something wrong and cannot be corrected, which not only would do harm to their academic performance, but also make a strongly negative influence to themselves in the long run. (deleting, adding)	Liu: For example, The Battle at Lake Changjin has done that perfectly, because it successfully arouse people's admiration for the heroes in the form of film. Liu: For example, The Battle at Lake Changjin has done that perfectly, for the reason that it successfully arouse people's heartfelt admiration for the heroes and martyrs in the form of film. (rephrasing, adding) Liu: For example, The Battle at Lake Changjin has done that perfectly, for the reason that it successfully aroused people's heartfelt admiration for the heroes and martyrs in the form of film. (correcting)

3.3 Explaining dynamic interactions

Regarding Research Question 2, results revealed that two groups demonstrated dynamic interaction patterns in the writing across contexts. Based on Engestrum's (2015) extended activity model, this study found the listed mediating factors (see Figure 4): object (goal), subject (agency and emotion), instrument (technological affordances), rules (collaborative writing strategies), division of labor (roles), and community (team management).

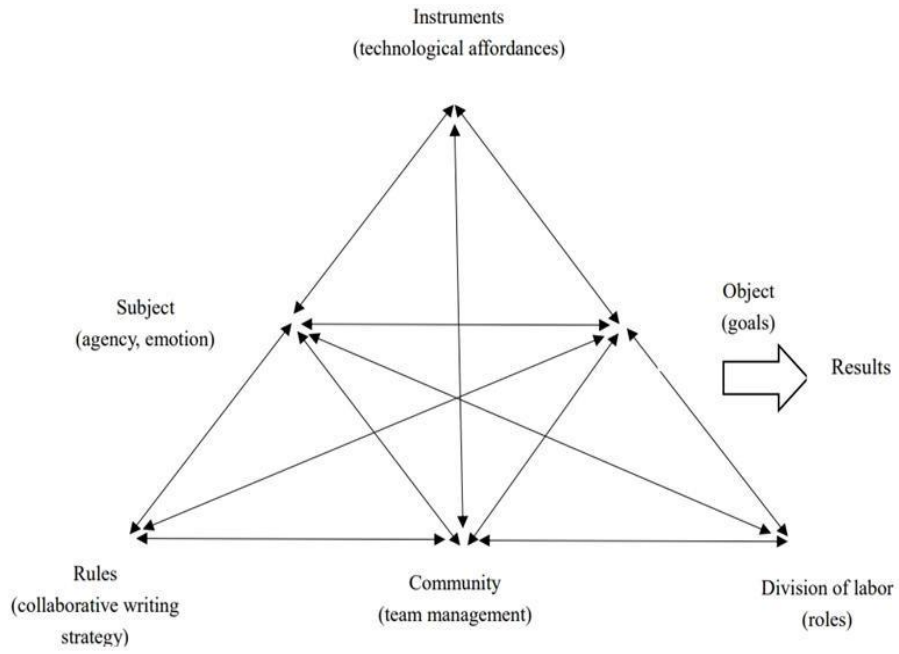


Figure 4: Extended model with sociocultural factors identified in this study

Goal

Students' response regarding their goals in the interviews and reflection papers demonstrated that Group One had different goals in Task One, including being a facilitator, getting high scores, and expanding their social network. As they moved to Task Two, more convergent goals emerged, which accounted for their increased participation across contexts. Group Two also exhibited a dynamic change in goals during collaborative writing. Three members had various goals, including "getting good scores", "gaining leadership", and "improving teamwork" in Task One. However, when changing to different context, participants set more personal goals.

For example, the assigned leader, Yu, set his goal as "to complete the task" due to his need to prepare for an important exam. This suggested that their personal goal became more pressing in the out-of-class context, which overrode task commitment. Eventually, two participants focused on their own goals to finish their respective parts, and Yu withdrew from the task. For instance, interview data showed that Liu commented "completing our own part and then merging them later was much easier," and Dong reflected that "we just wanted to get it done quickly due to conflicting thoughts." Yu further explained in the interview that "they already divided the workload, so I didn't believe my opinion mattered much.

Agency and emotion

Agency was found by investigating the pronouns and nouns in interviews, reflection papers, and comments (Donato, 1994). Agency involves one's capacity to decide, control, and self-regulate to accomplish the shared goal of the activity (Duff, 2013) and is further divided into individual agency and collective agency (van Lier, 2008). Group One showed both types of agency across the two tasks. Individual agency can be found in participants' discussions about their own engagement, such as "I can see the writing or discussion records easily". Collaborative agency can be observed when students expressed how they jointly compose texts, such as "We were active when correcting mistakes." In the meanwhile, participants held increasingly positive emotions to group work, which facilitated their collaboration across tasks. However, Group Two showed dynamic agency across two writing tasks. In Task One, members demonstrated similar individual and collaborative agency, but when writing in the out-of-class context, individual agency was more apparent. Moreover, they tended to use non-collaborative words to address others, such as "he/she/that one/they/others." For example, Dong grumbled in the interview, "Yu was always bossy and gave orders to us…in fact, he's the irresponsible one." Expressions of negative emotions were also found in the data. Liu stated in the reflection paper that "I felt disappointed because Yu refused to share his ideas and disappeared," while Yu mentioned feeling "sad and frustrated when others didn't respect my ideas" in the interview. These emotional expressions, along with the distancing language, indicate Group Two's growing individual agency and negative emotions in the out-of-class context.

Roles

Students were asked to describe their own role and evaluate others' contributions during the semi-structured interviews. Their self-identified roles could either match or dis-match their other-identified roles. When students' self-identified roles matched how others perceived them, positive responses emerged, and group interaction increased. To some degree, the explicitness of the writing context helped Group One to match roles. Gao, as the group leader, facilitated the decision-

making and writing procedures, which were positively acknowledged and responded by her group members, therefore strengthening Gao's role as a leader. Under Gao's guidance, they scaffolded each other, contributed to the discussion and writing text, and collaborated in a harmonious manner in both contexts. By contrast, when there were discrepancies between students' self-identified and other-identified roles, group interaction decreased. In Group Two, Yu took his role as a leader for granted and gave orders to others in Task Two, which was negatively responded to. Liu and Dong didn't recognize Yu's leadership, and didn't follow his plan or arrangement, leading to Yu's frustration and withdrawal. The writing context exacerbated the role mismatch and further weakened group interaction.

Collaborative writing strategy

Collaborative writing strategy means the comprehensive approach that a group adopts to coordinate their writing (Ede & Lunsford, 1992) or the specific plan a group intends to use during collaborative writing (Horton & Rogers, 1991). Lowry et al. (2004) proposed a taxonomy that classifies collaborative writing strategies into five major categories: group single-author writing, sequential single writing, parallel writing, reactive writing, and mixed-mode writing. Different writing strategies determine how writers negotiate ideas, distribute responsibilities, and integrate individual contributions into unified texts during collaborative writing.

Writing context promoted engagement if the implemented collaborative writing strategy required consistent communication among group members (as in Group One); by contrast, it reduced engagement when the strategy involved communication (as in Group Two). In the in-class context, Group One improved efficiency by adopting a parallel writing strategy, where the writers divided the collaborative task into separate parts and wrote in parallel (Stratton, 1989). In the out-of-class context, they switched to a reactive writing strategy, where they responded to and adjusted one another's changes without any previous planning or coordination (Horton et al., 1991). The timely change of writing strategy provided them with more collaborative possibilities to generate ideas, compose and revise texts asynchronously.

For Group Two, they collaborated well when adopting a parallel writing strategy in the in-class context. However, problems arose when they struggled to reach an agreement on the strategies in the out-of-class context. Yu preferred sticking to the parallel writing strategy, while others finally adopted sequential writing strategy, where each student wrote at a given time and passed it on to the next one (Horton et al., 1991). When Group Two members failed to agree on the collaborative writing strategy, the conflicts resulting from the new writing context negatively exacerbated the decrease in interactions.

Team management

Team management is the process through which a group coordinates and directs collective efforts to successfully complete tasks, including objective setting, communication, and performance assessment (Wawak, 2024). The leader and participants implicitly manage team management by identifying problems and resolving conflicts.

Different writing contexts required students to adjust their team management strategies to better adapt to the new writing context. Effective team management can enhance interaction, and vice versa. In the former case, the writing context reinforced the cohesive team management in Group One by supporting goal setting, facilitating mutual supervision, and creating collaborative atmosphere. In the latter case, however, the writing context negatively influenced group interaction in Group Two. The lack of recognized leadership and loose organization impede mutual understanding and effective problem-solving, which intensified group conflicts and greatly reduced group interaction.

Technical affordances

The writing tool ShiMo Docs has different functions to help students write collaboratively in different contexts. The real-time chatting box facilitated synchronous collaboration during in-class writing by enabling efficient idea exchange, as reflected by participants. For the out-of-class context, besides the aforementioned functions, the "Discussion" and "Comment" module can be used ubiquitously as whiteboards to monitor their interacting behaviors and recall key points collaboratively. The history module enabled all versions to be traced, edited and reverted, which provided detailed editing logs for learners to examine and evaluate during writing, thus increasing transparency among members, motivating learners' contribution, and accelerating group interaction. However, Liu and Dong in Group Two did not explore the potentially useful functions in ShiMo Docs at all, while Yu only used the discussion module for a few times, which aggregated tensions among group members and constrained their interactions.

4. Discussion

This study examined students' interaction patterns as small groups wrote across different writing contexts and the sociocultural factors that mediated their group interaction. Regarding our first research question concerning the interaction patterns, this study revealed that two groups of EFL secondary students showed dynamic interaction patterns while writing across different MALL-based writing contexts, which were reflected in different levels of equality and mutuality through a close examination of language functions and writing change functions. Different

from research reporting relatively stable and static interaction patterns (Cho, 2017; Su et al., 2022), this study echoes previous research (Aubrey, 2022; Cho, 2017; Li & Zhu, 2017) reporting similar dynamics in collaborative writing, but further demonstrates that, beyond factors such as task type, learner proficiency, and regulation strategies, writing context also plays an essential role in mediating interaction patterns.

In the in-class task, both groups followed a facilitator/collaborative pattern with relatively high equality and high mutuality, where one member directed the task and facilitated the writing process while others contributed collaboratively to writing discussion and task negotiation. However, their interactions diverged in Task Two. Group One showed a collaborative pattern with higher equality and mutuality, engaging in frequent mutual communication (e.g., balanced language/writing acts, a high response rate). In contrast, Group Two shifted to a cooperative/withdrawn pattern, showing low equality and mutuality (e.g., uneven contributions and a minimum response rates). As such, a new facilitator/collaborative pattern (with relatively high equality and high mutuality) and a cooperative/ withdrawn pattern (with both low equality and mutuality) need to be added to Storch's (2002) interaction model (see Figure 5). The findings further indicate that technology does not automatically ensure successful collaborative writing, as cautioned by Zheng et al. (2013) and Kukulska-Hume (2015). Unlike the face-to-face collaborative writing groups demonstrating dominant/passive pattern in Storch (2002) and Watanabe (2008)' s research, learners working in the mobile - assisted writing may have the option to withdraw from writing, which can be detrimental to their meaningful interaction. This phenomenon aligns with Su & Zou's (2021) research that without proper scaffolding, mobile tools can potentially lead to fragmented and disturbed participation in language learning tasks.

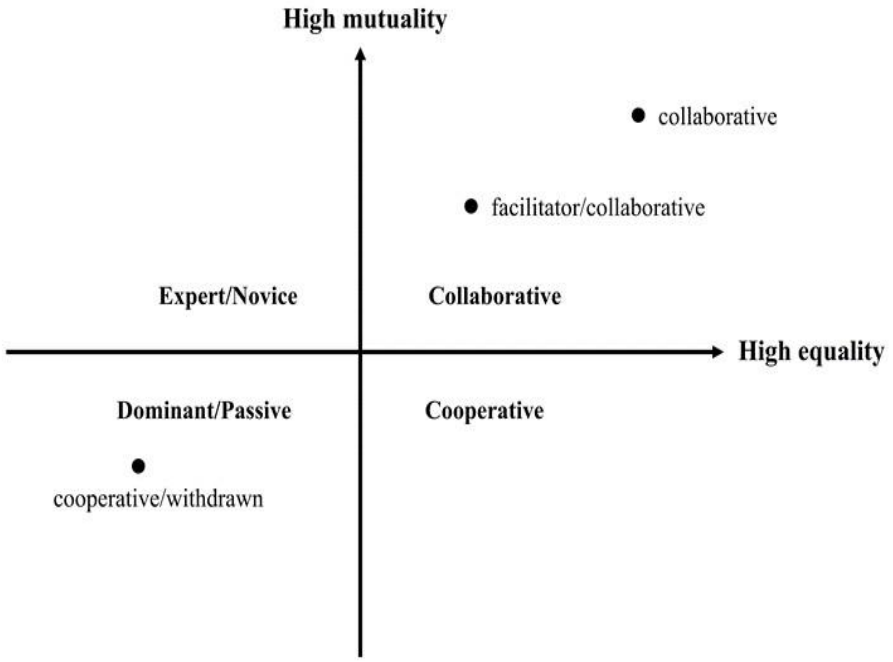


Figure 5: Interaction patterns shown in Storch's (2002) model

Regarding Research Question Two, our study identified different mediating factors and examined how writing context influenced interaction through the following sociocultural factors: goals (object), agency and emotion (subject), roles (division of labor), collaborative writing strategy (rules), team management (community), and technical affordances (instrument). These factors reflect the six interrelated components in Engestrum's (2015) expanded activity model, demonstrating how sociocultural factors mediated students' interactions across writing contexts. This study echoes and extends previous research (Cho, 2017) by revealing that context shapes interaction based on participants' goals. The new in-class context provided Group One students with clear direction and shared goals, stimulating their participation and interaction in collaborative writing, while Group Two participants prioritized individual goals over collaborative tasks and led to reduced interaction, confirming Li and Zhu's (2017) study.

This study also indicated that writing context could affect interaction patterns through subject-related factors (i.e., agency and emotions). This builds on Li and Zhu's (2017) work by showing that flexible agency and emotions contributed to the dynamics in interaction patterns when students wrote collaboratively on two different tasks in the same writing context. Specifically, by interacting with others,

agency and emotions are constantly reconstructed and renegotiated during the process. Consistent with Cho's (2017) findings, this study showed that writing contexts affected agency and emotions, leading to changes in group interaction within the same context. In this study, however, group cohesion and mutual trust did not develop automatically over time as a result of students' collaborating experience, which contrasts with Aufa and Storch's (2021) study. This discrepancy may be attributed to different educational cultures: Chinese teacher-centered learning emphasizes more on hierarchical guidance, while western learner autonomy encourages self-directed collaboration.

In addition, based on the extended model of activity theory (Engestrum, 2015), this study demonstrated how writing contexts influenced students' interaction through various sociocultural factors, such as roles, collaborative writing strategy, team management, and technical affordances (see Figure 4). Writing context enabled the explicitness of students' roles to influence students' interactions, confirming Cho's (2017) research. When self-identified roles aligned with other-identified roles (Group One), their group interaction increased; when roles conflicted (Group Two), their interaction decreased. To maximize the benefits of different writing contexts, the corresponding specific arrangements, such as collaborative writing strategy, need to be thoroughly prepared in advance (Kost, 2011). As these factors are closely related to tasks, their integration with writing contexts significantly influences group interactions. As long as the writing strategy was properly applied, their group interaction would be promoted (Group 1), while it would be diminished if employed improperly (Group 2).

Moreover, this study supported previous findings (Lai, 2015; Richards, 2015) that the out-of-class context offered opportunities for groups to control and manage teamwork to promote collaboration. If participants could adjust their team management strategies accordingly, it would lead to more interaction, and vice versa. Furthermore, compared with collaborative in-class writing, the out-of-class context can further help promote interactions if participants utilize the ShiMo technical functions properly. This study implies that, instead of confining the learning opportunities to classrooms, students can use ShiMo Docs to write at different times and locations, allowing greater flexibility. It further demonstrates that MALL enabled learners to engage in flexible, self-directed, and seamless language learning experiences across time and place (Wang, 2023; Kukulska-Hulme, 2015; Lai, 2015).

Our study also demonstrated that writing contexts are merely blueprints (Lai, 2016), and that learners may interact quite differently depending on the aforementioned sociocultural factors. The in-class context facilitated writing efficiency through immediate peer feedback and instructor guidance, while the out-of-class context relied more on learners' autonomous self-regulations. While and Oskoz and Elola (2016) asserted that writing process is directly mediated by

digital affordances, this study revealed a more complex interaction. Although it may be plausible to assume that learners would show more collaborative engagement in the in-class context due to its facilitative nature, Group Two surprisingly showed a more collaborative stance in the out-of-class context. Therefore, this study suggests that contexts interact dynamically with sociocultural factors to co-mediate students' interactions in MALL-based collaborative writing.

5. Conclusion

In this study, we illustrated the dynamic interaction patterns when students engaged in MALL-based collaborative writing inside and outside the class. Engestrum's (2015) extended activity theory offered a theoretical framework to explain the dynamic interaction and provided new perspectives to the students' interactions in collaborative writing. This study enhances our insights into how mobile technology facilitates collaborative writing and L2 development and reinforces applying sociocultural theory in examining how writing contexts influence students' interaction in collaborative writing. While most previous research on MALL-based collaborative writing has centered on L2 learning in tertiary settings (Yeh, 2014; Zhang, 2020), this study extends the investigation to secondary EFL learners.

5.1 Theoretical implications

This study makes several contributions to the existing literature. First, it extends current models of interaction patterns in collaborative writing by identifying two new patterns—facilitator/collaborative and cooperative/withdrawn patterns. Although prior studies (Chen & Zhang, 2024; Hsu, 2020; Storch, 2002; Li, 2013) have provided valuable frameworks to classify learner interactions based on mutuality and equality, these models have largely focus on face-to-face or static online writing contexts. Our findings, however, suggest that new interaction patterns emerge as students are engaged in MALL-based collaborative writing. Moreover, this study adds theoretical depth to our understanding of interaction as a dynamic and context-sensitive process. While previous research (Azkarai, 2023; Cho, 2017; Li, 2013) has often reported a single, fixed interaction pattern within a given task or context, this study bridges the gap by revealing that learners' interaction patterns can change fluidly as they write across both in-class and out-of-class contexts. As Zhang (2019) stated, peer collaboration should not be regarded as a static process dominated by one predominant pattern but rather as a dynamic one. These dynamic patterns reveal how learners naturally change their specific roles, share their responsibilities, and engage with group members in meaningful ways, deepening our understanding of effective interactive processes in L2 collaborative writing.

Second, this study builds on prior research (Cho, 2017; Storch, 2004) to investigate the complexity of factors mediating learners' MALL-based collaborative

interaction. Drawing on Engestrum's (2015) expanded activity model, we make a fresh attempt to show that learner interaction is shaped not only by individual goal-directed factors (e.g., subjects or instruments) identified in previous research (Li & Zhu, 2017; Li, 2013; Storch, 2002) , but also by broader social mediators within the activity system, such as rules, division of labor, and community. The current study found that students' interaction patterns were mediated by the different writing contexts through multiple context-related factors: goals, agency and emotions, roles, collaborative writing strategy, team management, and technical affordances. The findings indicate that efforts should be focused on promoting the positive aspects and reducing the negative aspects of writing contexts. Moreover, the activity system was not static but constantly adjusted as students adapted to new contexts and group dynamics. Therefore, this study helps explain not only what patterns emerged, but also why they changed, offering a more holistic explanation of group dynamics.

5.2 Practical implications

This study also has valuable practical implications for encouraging students to better engage in MALL-based collaborative writing. First, we should emphasize well-structured pre-task training on multiple ShiMo functions, collaborative writing strategies, and writing contexts. As suggested in previous research (Su et al., 2022), since most students are new to the writing platform, the training of different technological affordances should be clearly provided before writing to improve efficiency and participation. During the writing process, students should be encouraged to discuss how to develop bilateral engagement and co-authorship using ShiMo Docs for better collaborative writing. Besides, illustrative examples and suggestions regarding collaborative writing strategy can be offered to help students choose appropriate and efficient writing strategies in different contexts. Furthermore, the pros and cons of different writing contexts should be clearly stated before writing to enable students to solve potential conflicts and problems. Instructors may also need to explicitly discuss potential tensions between collaborative goals and students' privileging goals. Acknowledging such tensions can help normalize the challenge and provide opportunities for negotiation when problems occur.

Secondly, the instructor needs to serve as a supervisor and guide in the collaborative writing process across different contexts. Some students in this study gave up writing because of communicative difficulties, inadequate negotiation, or privileging goals. Thus, instructors' help and well-structured instructional design are crucial for developing learners' positive attitudes and problem-solving abilities. The instructor should monitor students' writing process, respond to their inquiries, and guide students' communication and interaction in the process. This study suggests that instructors should emphasize training in communication skills,

helping participants resolve conflicts and improve learning opportunities. For example, instructors can address individual-group tensions through open discussions and ongoing guidance, helping learners to see how collaboration can support—rather than hinder—their personal goals.

Thirdly, from the learners' perspective, collaborative writing should not be confined to a fixed writing context. Learners need the freedom to manage the context in ways suitable for their goals and preferences, which extends earlier research (Cho, 2017; Li, 2013; Storch, 2017) that focused on collaborative writing in a single writing context. By contrast, having the freedom to autonomously manage writing contexts may reduce pressure and help them collaborate based on their own space and schedule (Kukulska-Hulme, 2015; Surhaug, 2026; Zhang & Zou, 2022). Learners can first discuss and plan the writing process, decide the context that suits their writing purpose, and then selectively combine features from one or multiple contexts. In this way, different groups can choose different modes of writing context (in-class, out-of-class, or combined) in different ways (face-to-face, online, or combined) flexibly and adapt them according to their preference or actual situation in the writing process. This flexibility may also balance learners' collaborative and individual goals, thus reducing the likelihood of student withdrawal.

Fourthly, as students are now exposed to different learning contexts during mobile learning (Lai, 2015; Su & Zou, 2022), the technological affordances of platforms like ShiMo Docs can be further optimized to better support collaborative writing across contexts. Platform developers are encouraged to improve features that facilitate process monitoring and user engagement. For example, integrating a "notification" function that alerts users to updates and revisions can help sustain out-of-class collaboration. Additionally, as process assessments are crucial for the successful implementation of collaborative writing (Peng, 2024), integrating structured self- and peer-assessment tools, along with clearer visualizations of individual contributions, would strengthen group responsibility and group cohesion. With continuous assessment, this evaluation can help learners to consciously monitor their group writing procedures and promote group interaction. Such improvements could contribute to more flexible, context-responsive, and transparent collaboration.

5.3 Limitations and future research

The limitations of this study also deserve our attention. Because this study examined secondary EFL learners' MALL-based collaborative writing on argumentative essays, students' interaction patterns might vary when writing different genres. In addition, the findings of this study should be interpreted with caution given the culturally specific context. All participants were EFL learners with similar Chinese cultural background, whose perception of group work, leadership,

and collaboration may have been shaped by collectivist cultural values, hierarchical classroom norms, and exam-oriented educational system. These cultural factors might have influenced how learners interact and negotiate their roles, particular in collaborative writing that requires autonomy and equal participation. Therefore, the generalizability of the research findings may be limited in other cultural contexts. Future research can conduct similar studies in different cultural settings to explore whether similar interaction dynamics emerge and how sociocultural factors might differ cross-culturally (Jiang & Zhang, 2020). This study introduced some training and orientation programs, but the trainings were mainly one-shot intervention. Future research may incorporate a contextualized and ongoing training approach, including constant reminders from the teacher on different writing strategies, and early identification and intervention of collaborative behaviors.

To sum up, this study explored participants' interaction patterns in the in-class and out-of-class contexts and highlighted how writing contexts shaped students' interactions through a sociocultural perspective. This study also explained the mediating factors influencing MALL-based collaborative writing across writing contexts drawing on the extended activity model and further deepened our understanding of interaction dynamics and writing contexts. As indicated by Li (2018), dynamic group interactions and factors influencing collaborative writing will remain key research areas in the coming years. Such investigation advances our understanding of L2 collaborative writing in technology-assisted environments, offering both theoretical insights into group interaction and practical guidance for optimizing writing contexts to enhance group collaboration in the mobile era.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Statement on data availability

In accordance with Journal of Writing Research policy, authors are expected to make anonymised data available for the papers they publish. However, due to the nature of the data reported in this study, effective anonymisation was not possible. As a result, the data cannot be made publicly available.

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Appendix A: Pre-task questionnaire

The following questionnaire is used for my study on MALL-based collaborative writing. I'd like to invite you to answer questions regarding your background information and your English learning experiences. All the data collected will be confidential and will only be used for this study. Thanks for your help!

1. Gender: □Male □Female

2. Age: _____

3. You have been learning English for how many years? _____

   What are your goals of learning English? _____

4. Your attitude to your English learning experience is: □Very positive □Positive □Neutral □Negative □Very negative

   Please provide reasons for your choice:

   _____

5. Your English level is:
   □Elementary □Pre-intermediate □Intermediate □Upper-intermediate □Advanced

6. Your English writing skill is:
   □Very poor □Below average □Average □Above average □Excellent

7. How often do you use your mobile devices? _____hours per day

   What do you usually use mobile devices for? (choose one or multiple)

   □Study □Fun □Social Networking □Other_____

8. How comfortable are you when you use mobile devices for educational purposes?

   □Very uncomfortable □Uncomfortable □Neutral □Comfortable □Very comfortable

9. Have you worked on any team projects via ShiMo Docs? If yes, briefly comment on the experience.

   _____

_____

Your experience using other mobile writing Apps (e.g., Google Docs, Dingding Docs)

_____
_____

Your attitudes to individual work is :
□Very positive □Positive □Neutral □Negative □Very negative

Your attitudes to collaborative work is:
□Very positive □Positive □Neutral □Negative □Very negative

In educational setting, which type of working style do you prefer? (choose one)
□Individual work □Group work

10. Are you familiar with your partner in this project? If yes, how long you have known each other?

_____
_____
_____

Appendix B: Interview guide

1. What is your goal of the taking part in the collaborative writing?
2. In your opinion, what is your role and your group members' role during the MALL-based collaborative writing tasks?
3. What do you think of the group interactions in the MALL-based collaborative writing? Do you enjoy it? Why?
4. In your opinion, what have influenced the way members interacted in the collaborative tasks?
5. How did your group manage time when writing inside and outside the class?
6. Do you think your interactions with partners when writing collaboratively in class and out of class is different? If yes, what's the difference?
7. In your opinion, what are the advantages and disadvantages of using ShiMo Docs to conduct collaborative writing compared with the traditional paper-and-pen collaborative writing?
8. What is your overall impression of the MALL-based collaborative writing experience?

   Please read the brief report about your group interactions/dynamics. Do you think my report accurately reveals the real phenomenon/situation? If not, please correct or comment on the part that you think is inappropriate.

Appendix C: Reflection paper prompts

1. What is your feeling of working on the MALL-based collaborative writing tasks in small groups?
2. Do you think ShiMo Docs contributes to your task completion and collaboration? Why or why not?
3. How did you and your group members deal with the four collaborative writing tasks?
4. Did group member in your group play a certain role? If yes, what is the role and in what ways?
5. What do you think of your own and your group members' contributions to the collaborative work in the writing tasks?
6. Do you have any suggestions to make the MALL-based collaborative writing more efficient for future students.

Appendix D. Detailed inter-coder agreement by sub-category

Category	Subcategory	Percent Agreement (%)
Language Functions	Questioning	88.5
	Suggesting	90.1
	Elaborating	92.4
	Stating	91.2
	Agreeing	93.6
	Disagreeing	89.7
	Justifying	92.8
	Eliciting	90.9
Writing change Functions	Adding	90.1
	Deleting	91.8
	Rephrasing	93.2
	Correcting	94.1
	Reordering	92.3