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Interaction Dynamics in Collaborative Writing: The Impact of Communication Mode and Learner Goals in EFL Dyads

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***Abstract*—This study examined how six male English as a foreign language (EFL) learners engaged in dyadic collaborative writing via three communication modes: face-to-face, synchronous computer-mediated communication using only text chat, and synchronous computer-mediated communication using only voice chat. It also assessed the influence of learners' individual goals. Participants were paired by proficiency, and activity theory was employed to analyze their interaction patterns in terms of mutuality and equality. Face-to-face and voice chat modes encouraged high mutuality, equality, dynamic exchange, immediate feedback, and engagement. However, the mutuality of text chat interactions focused on functionality, reducing opportunities for relational engagement and language-based discussion. While two pairs focused on balanced collaboration, the third developed an expert/novice dynamic, with one partner leading but facilitating joint decisions. Relational goals appeared crucial for mutual engagement, and effective communication modes appeared to optimize collaborative writing. These findings could inform the design of collaborative language learning tasks in various settings.**

***Index Terms*—activity theory, collaborative writing, communication mode, interaction pattern, motive**

I. Introduction

Learner interactions in pairs or small groups have been shown to facilitate second language (L2) learning, as peer interaction allows learners to use their L2 to negotiate meaning and focus on form (Sippel, 2024). Negotiations involve interactional moves such as repetitions, confirmation checks, and recasts, which provide more comprehensible feedback (Storch, 2021). Furthermore, sociocultural theory posits that interaction is key to cognitive development, enabling learners to express thoughts and build L2 knowledge by combining linguistic resources and co-construct new ones through scaffolded interactions (Donato, 1994).

Collaborative activities are supported by communicative and task-based approaches to L2 instruction, allowing learners to communicate by sharing ideas and negotiating form and meaning (Storch, 2021). Learners in pairs or small groups have greater opportunities to use the target language, exercise autonomy, and feel less anxious (Jin et al., 2021). Due to its potential advantages, research has highlighted the benefits of collaborative work in L2 writing classrooms.

Collaborative writing refers to the co-authoring of a single text by two or more writers (Storch, 2021), where pairs or small groups of learners all meaningfully interact in the L2 and negotiate decision-making tasks to produce a text (Storch, 2005). While most research on collaborative writing has explored face-to-face settings, recent studies have begun to focus on computer-mediated communication (e.g., Aubrey, 2022; Jiang et al., 2021; Jiang & Eslami, 2022; Vakili & Ebadi, 2022).

Computer-mediated collaborative writing has garnered attention for expanding collaboration beyond the constraints of regular class time. Web-based tools such as Google Docs support the entire writing process, from task planning to negotiation, co-construction, editing, and producing the final product in a reciprocal and participatory manner (Li, 2018). While having learners interact in pairs or small groups offers more opportunities to practice (Vakili & Ebadi, 2022), not all learners engage collaboratively (Aufa & Storch, 2021). Regardless of the communication mode, learners may exhibit distinct patterns of interaction when co-constructing texts (Rouhshad & Storch, 2016). One factor impacting the success of collaborative writing is the relationship that learners establish during the tasks, specifically their patterns of interaction (Storch, 2021). Thus, understanding how these learners interact could help increase learning opportunities.

Despite the growing body of research on collaborative writing in face-to-face and asynchronous computer-mediated contexts, studies exploring synchronous computer-mediated communication and its influence on interaction patterns are lacking (Cho, 2017). Furthermore, few have examined how synchronous communication tools such as text and voice chat influence collaborative writing among English as a foreign language (EFL) learners, especially in under-researched contexts like Saudi Arabia. To address this gap, the present study offers insights into the interaction patterns of such learners while working in pairs on collaborative writing tasks using three synchronous communication modes: face-to-face, text chat, and voice chat.

II. Literature Review

Studies on collaborative writing have explored learners' interaction patterns across various L2 learning contexts in face-to-face environments (e.g., Storch, 2002, 2005; Storch & Wigglesworth, 2007; Watanabe, 2008; Wigglesworth & Storch, 2009). They have demonstrated that learners' interaction patterns can influence their writing performance and learning outcomes. Storch (2002) examined whether the interaction patterns in pairs affected English as a second language (ESL) college students' language learning. Drawing on Damon and Phelps' (1989) concepts of equality (shared control over task direction) and mutuality (learners' level of engagement with each other's contributions), Storch proposed four interaction patterns: collaborative (high equality and mutuality), dominant/dominant (cooperative; high equality but low mutuality), dominant/passive (low equality and mutuality), and expert/novice (medium-low equality and medium-high mutuality). Pairs who adopted a collaborative approach (collaborative or expert/novice) experienced greater knowledge transfer in subsequent writing tasks than those who took a non-collaborative approach (dominant/dominant or dominant/passive).

Storch and Wigglesworth (2007) and Wigglesworth and Storch (2009) compared the individual and collaborative writing tasks of ESL students and found that collaboration enhanced writing by facilitating idea-sharing and pooling linguistic resources, which improved accuracy. Watanabe (2008) found that both higher- and lower-proficiency peers could improve writing performance when they shared ideas and made equal contributions.

Recent studies have explored interaction patterns in face-to-face and computer-mediated environments. For example, Rouhshad and Storch (2016) examined 24 intermediate ESL pairs completing tasks face-to-face and through synchronous computer-mediated communication. Face-to-face interactions fostered collaboration and language focus, which were less frequent in computer-mediated settings. They concluded that communication mode, rather than relationships, affected language focus. Tan et al. (2010) studied six pairs of students learning Chinese over 10 weeks using MSN Messenger and face-to-face interactions. Computer-mediated communication often encouraged cooperation, whereas face-to-face interactions showed expert/novice or dominant/passive patterns. Different modes thus exhibited distinct interaction patterns.

This study was guided by Leont'ev's (1978) activity theory, which suggests that both conscious and subconscious motives drive activities. The model elucidates the relationship between individuals and their sociocultural context (Bitchener & Storch, 2016), viewing activities as collective endeavors (Hardman, 2008). Human actions are motivated by object-oriented needs and mediated by cultural artifacts (e.g., symbolic tools). Engeström (1987) expanded activity theory by introducing concepts such as rules, community, and division of labor, as illustrated in Figure 1, to analyze activities within their dynamic social context.

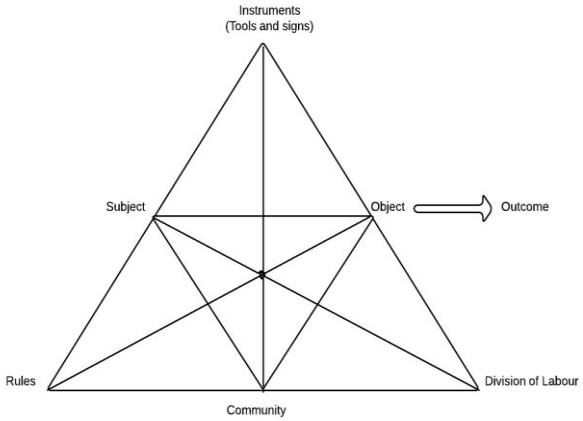

Figure 1. Engeström's Model of Activity Theory (1987)

In this model, community refers to the social context in which an activity occurs, such as a classroom (Engeström, 1987). Rules are the conventions regulating activities, dictating why and how individuals perform tasks (e.g., roles of interaction). The division of labor describes how responsibilities and power are distributed among community members (e.g., teachers and students). This model highlights the intersection of these components and their impact on outcomes, emphasizing that an activity system is shaped by the relationships between subjects, the community, rules, and tools, which mediate the interaction object.

Few studies have examined collaborative writing through a blended approach, combining immediate forms of communication, such as face-to-face interactions and synchronous computer-mediated communication (Storch, 2021). This gap is even more pronounced in EFL contexts like Saudi Arabia, where solitary work predominates in writing classes. Therefore, more research is needed on whether and how synchronous modes of communication, as critical factors (see Storch, 2021), influence interaction patterns. Drawing on activity theory, the present study enhances the current understanding of the impact of communication modes on how learners engage during collaborative writing tasks, aiming to answer the following research questions:

1. What interaction patterns occur when pairs of EFL learners engage in collaborative writing tasks using different modes of communication?

2. Do learners' goals influence these interactions?

III. Methodology

A. Setting

The study was conducted in a first-year EFL writing course at a large public university in Saudi Arabia. Participants were enrolled in a mandatory three-hour Writing II course, having completed the prerequisite Writing I course. The course, taught by the researcher, aimed to develop academic writing skills through intensive paragraph-writing tasks on various topics. In this type of class, where most instruction is in English, students typically write paragraphs based on the textbook every week, adhering to the traditional method of individual in-class writing.

B. Participants and Writing Tasks

Participants consisted of six male EFL students, aged 19 to 21, majoring in English. Participants were selected based on their IELTS scores, which ranged from 4.0 to 4.5 (see Table 1), meaning they were intermediate EFL learners. Each was randomly assigned to one of three pairs and informed that they would remain in the assigned pair until the end of the study. All were familiar with computer use, including online chat tools.

Table 1
Participants

Pair	Pseudonym	IELTS score	Familiarity with computers	Attitude about pair work
1	Ali*	4	Very familiar	Positive
	Salim	4	Very familiar	Positive
2	Fuad*	4.5	Very familiar	Positive
	Aziz	4.5	Very familiar	Very Positive
3	Sadun*	4	Very familiar	Neutral
	Abdul	4	Familiar	Neutral

Note. *Leader.

The participants were informed that they were required to collaboratively write three argumentative paragraphs using three modes of communication: (a) in-class face-to-face interactions with pen and paper, (b) synchronous computer-mediated communication through text chat only, and (c) synchronous computer-mediated communication via voice chat only, as shown in Table 2. Previous research suggests that employing synchronous forms of communication through oral and written output can enhance student interaction and assist them in making collective decisions more easily (Li, 2018; Storch, 2021). All participants were informed that each pair needed to produce a single text collaboratively and use their L2 (English) while completing the collaborative writing tasks.

Table 2
Writing Tasks and Communication Modes

Task	Instructions	Mode of communication
1	"Social media is damaging our personal relationships." Write a 160-word paragraph discussing this statement and give your opinion about it.	Face-to-face
2	"Studying English is very important nowadays." Write a 160-word paragraph discussing this statement and give your opinion about it.	Text chat using Google Docs and WhatsApp
3	"Moving to a large city is necessary for any ambitious family." Write a 160-word paragraph discussing this statement and give your opinion about it.	Voice chat using Google Docs and Zoom

Writing topics were chosen from the textbook to closely resemble regular classwork. Composing argumentative texts can create more opportunities for critiquing arguments and engaging in extended negotiations of ideas and opinions to reach a compromise, thus encouraging learners to participate in resolving any conflicts that arise (Storch, 2021). Therefore, these tasks can offer learners additional chances for extended L2 practice.

C. Data Collection

Data were collected over six weeks following approval from the host university, where the researcher was employed as an instructor. In Weeks 1 and 2, participants attended a four-hour face-to-face training session with the researcher about the three collaborative writing tasks. Each pair was asked to select a leader to monitor the tasks, create Google Docs files, and screen-record the synchronous computer-mediated tasks. The participants completed a questionnaire that gathered background information and received instructions for using Google Docs. In Week 3, the participants met in class and engaged in audio-recorded face-to-face collaborative writing. To promote appropriate collaborative engagement during the face-to-face task, the researcher was present in class and actively encouraged participants to co-construct the text. Each member of the pair was given a different colored pen to track suggestions and amendments. Task 2 (text chat) took place in Week 4, during which the participants logged into a Google Docs document created by the leader and composed text collaboratively and synchronously using WhatsApp for text chat (see Figure 2). Google Docs has features that allow multiple collaborators to set up private documents and compose and revise content in a reciprocal and participatory manner. Another feature enables learners to comment on each other's contributions, which can be tracked through revision

history. Such tools provide opportunities for extended out-of-class interaction, allowing learners to work collaboratively on their writing tasks with ease and efficiency.

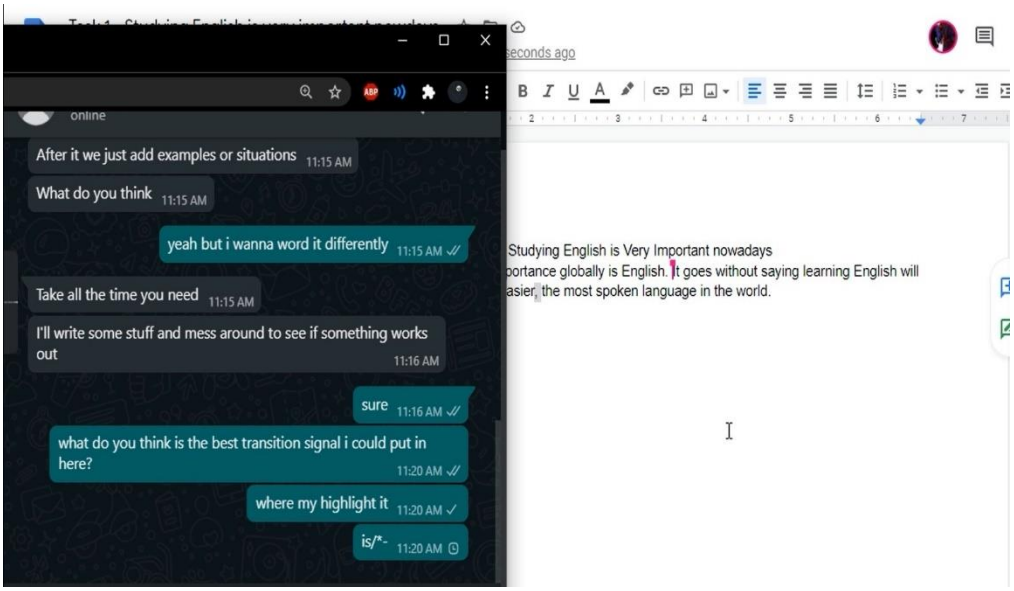

Figure 2. Student Engagement on WhatsApp

The researcher monitored interactions using WhatsApp messaging timestamps. In Week 4, participants wrote synchronously via Google Docs and voice chat (Zoom), replicating face-to-face classroom interactions. Tasks 2 and 3 were screen-recorded to observe off-task activities. In Week 5, audio-recorded semi-structured interviews were conducted to explore participants' perceptions of collaborative work using different communication modes. Thus, data were collected via questionnaires, paper and Google Docs drafts, transcribed interactions, text chat logs, and interview transcripts. The written drafts demonstrated learners' engagement in co-constructing texts, while the transcripts and chat logs illustrated their collaborative approach. The interviews provided additional insights. Informed consent was secured prior to the interviews.

D. Data Analysis

Data analysis revealed interaction patterns for each pair in every task. Face-to-face interaction patterns were examined using Storch's (2002) model of dyadic interaction, based on Damon and Phelps's (1989) intersecting continua of equality (the degree of contribution and control over task direction) and mutuality (the level of engagement with a partner's contributions). In computer-mediated communication, equality and mutuality were assessed using Li and Kim's (2016) analytical framework, focusing on aspects that highlighted the distinctive features of this communication mode: language functions and writing change functions. Language functions pertain to the mediating functions of language used in computer-mediated communication while planning and negotiating tasks, including agreement, elaboration, and acknowledgment. The researcher first segmented the transcripts into idea units to analyze language functions, and a second reader reviewed these segmentations, achieving 91% agreement. An external researcher coded 35% of the transcripts, resulting in 88% inter-rater agreement. Any disagreements were resolved through discussion.

The writing change functions denote text co-construction behaviors in Google Docs, such as adding, deleting, and correcting, as evidenced by the archived revision history. This feature tracked all contributions made by each pair member, allowing the researcher to monitor the collaborative process. To evaluate the equality of interaction, the frequency, types of language functions, and writing change functions for each member were checked and compared. Balanced instances of language and writing change functions would suggest a similar contribution level to the task, indicating high equality, while unequal frequencies would suggest low equality.

To analyze the mutuality of peer interaction, each pair's *initiating* language functions (proposing new ideas) vs. *responding* language functions (reacting to peer's ideas) and *self* vs. *other* writing change functions were examined to identify mutual engagement in the process of writing (Li & Kim, 2016). The researcher and an outside coder independently coded 30% of the history. The inter-rater reliability was 89%, and an immediate discussion between the two coders resolved disagreements. The remaining data were coded, and the frequencies for each category were calculated. The researcher analyzed how each pair member interacted and negotiated the writing task by quantifying the type and frequency of language functions produced by each member.

IV. Findings

A. Patterns of Interaction

(a). Pair 1

Table 3 summarizes the results of Pair 1's interaction, showing that the two members (Ali and Salim) made joint contributions when composing texts across communication modes. They collaboratively engaged in task discussions and text construction, as indicated by the language and writing change functions produced. The pair exhibited high equality in the face-to-face, text chat, and voice chat modes, with equal contributions to task discussion (103, 96, and 148 instances of language function moves, respectively) and text co-construction (17, 19, and 22 instances of writing change function acts, respectively). The two members made balanced contributions throughout the composition process across the three modes but generated more language and writing change functions in voice chat than face-to-face or text chat.

TABLE 3
PAIR 1 LANGUAGE AND WRITING CHANGE FUNCTIONS

	Face-to-face			Text chat			Voice chat		
	Ali	Salim	Subtotal	Ali	Salim	Subtotal	Ali	Salim	Subtotal
Language functions	▪ INIT: 30 ▪ RESP: 24	▪ INIT: 26 ▪ RESP: 23	56 (54%) 47 (46%)	▪ INIT: 25 ▪ RESP: 22	▪ INIT: 29 ▪ RESP: 20	54 (56%) 42 (44%)	▪ INIT: 43 ▪ RESP: 29	▪ INIT: 39 ▪ RESP: 37	82 (55%) 66 (45%)
Subtotal	54 (52%)	49 (48%)		47 (49%)	49 (51%)		72 (49%)	76 (51%)	
Example	Ali: This task is about how social media is damaging our personal relationships. So the ideas will be about the negative of social media [Stating]. What do you think, my friend [Eliciting]? Salim: Yeah, yeah [Agreeing]. Ali: Okay, now we should go with our supporting sentences. [Suggesting] Salim: Okay, we can say, for instance, if a father spends some time on Instagram, he might forget about his children or wife and, therefore, have a broken relationship with his family. [Suggesting] What do you think? [Eliciting] Ali: Forget about the wife or a broken relationship. I don't think that's a good supporting sentence [Disagreeing]			Ali: I will write this: having good English could be the boost [Suggesting]. Salim: the boost.. the boost you need [Suggesting]? Ali: Yeah [Agreeing]. Look how it is now [Eliciting]. Salim: Very good, very good [Acknowledging] Ali: […] Let's sum it up. [Suggesting] I think we've written enough [Justifying]. Salim: Okay, I think so [Agreeing]. Ali: Good, good. Let me draw the conclusion and tell me what you think [Requesting].			Ali: We can say there are going to be more job opportunities. [Suggesting] This is a very important reason for moving to a large city [Justifying]. Salim: There are [Suggesting] because you said opportunities, so opportunities refer to all [Justifying]. Ali: You're right [Agreeing]. There are going to be more job opportunities, and therefore, there are more chances to unlock your full potential [Elaborating]. Salim: Unleash? Maybe unleash your full potential [Suggesting]? Ali: Unleash is even better [Agreeing], awesome [Acknowledging]!		
Writing change functions	▪ Self: 6 ▪ Other: 2	▪ Self: 6 ▪ Other: 3	12 (71%) 5 (29%)	▪ Self: 7 ▪ Other: 3	▪ Self: 5 ▪ Other: 4	12 (63%) 7 (37%)	▪ Self: 8 ▪ Other:3	▪ Self: 8 ▪ Other:3	16 (73%) 6 (27%)
Subtotal	8	9		10	9		11	11	
Example	Salim: Social media addition is brutal to all relationships and has a good chance to ruin them. [Adding, self]. Ali: Social media ~~addition~~ addiction is brutal to all relationships and has a good chance of ruining them. [Correcting, other].			Ali: it is the universal language and the language we usually communicate and consider to be the legitimate language. [Adding, self]. Ali: It is the universal language and the language we usually use to communicate, which we consider to be ~~the~~ legitimate ~~language~~. [Rephrasing, self].			Salim: First, living in a large city means more income, more oppurtunities [Adding, self]. Salim: First, living in a large city means more income and more opp~~u~~ortunities [Correcting, self]. Ali: First and foremost, living in a large city means more income and more opportunities. [Rephrasing, other].		

Note. The first member is the leader of the pair.

Pair 1 showed high mutuality across modes, with a higher percentage of initiating language functions (INIT in Table 3) than responding (RESP in Table 3). In the face-to-face task, Ali and Salim produced 56 (54%) initiating and 47 (46%) responding functions. In voice chat, they initiated 72 (55%) and responded 66 (45%) times. As shown in Table 3, they co-constructed the tasks by making suggestions and counter-suggestions and eliciting responses. Face-to-face, Ali disagreed with Salim's suggestion and modified the sentence, reaching a consensus. In text and voice chat, they used various language functions, co-editing text and building on each other's ideas. The frequent use of first-person plural pronouns (we, our) reflected co-ownership of the text. There were five (29%) writing change functions face-to-face, seven (37%) in text chat, and six (27%) in voice chat, indicating high mutual engagement across modes.

(b). Pair 2

In terms of equality and mutuality, Pair 2 (Fuad and Aziz) exhibited a collaborative pattern across all modes. As shown in Table 4, they demonstrated high levels of equality when interacting face-to-face, in text chat, and in voice chat, with language functions (126, 130, and 153) and writing change functions (19, 21, and 25) reflecting their joint engagement. Across modes, they frequently shared responsibility for composing texts, exchanging ideas, offering reciprocal feedback, justifying choices, and eliciting responses about language issues. The frequency of language and writing change functions indicated a strong sense of equality in their interactions.

The pair also showed constructive interactions and mutual engagement across modes, maintaining a high response ratio to initiating language and other writing change functions. As seen in Table 4, their interactions displayed clear reciprocal contributions, with initiating functions at 53%, 52%, and 56% and responding functions at 47%, 48%, and 44% in face-

to-face, text chat, and voice chat modes, respectively. Face-to-face, they coordinated to generate supporting ideas, deliberating and elaborating until they reached a consensus. Their shared responsibility for text creation was evident in their acceptance of each other's suggestions, such as Aziz accepting Fuad's correction in text chat and Fuad agreeing with Aziz's addition in voice chat.

TABLE 4
PAIR 2 LANGUAGE AND WRITING CHANGE FUNCTIONS

	Face-to-face			Text chat			Voice chat		
	Fuad	Aziz	Subtotal	Fuad	Aziz	Subtotal	Fuad	Aziz	Subtotal
Language functions	▪ INIT: 30 ▪ RESP: 33	▪ INIT: 37 ▪ RESP: 26	67 (53%) 59 (47%)	▪ INIT: 31 ▪ RESP: 33	▪ INIT: 36 ▪ RESP: 30	67 (52%) 63 (48%)	▪ INIT: 40 ▪ RESP: 34	▪ INIT: 45 ▪ RESP: 34	85 (56%) 68 (44%)
Subtotal	63 (50%)	63 (50%)		64 (49%)	66 (51%)		74 (48%)	79 (52%)	
Example	Fuad: I was wondering if we should talk about the fake happening in social media [Suggesting]. What do you think [Eliciting]? Aziz: I agree [Agreeing]. Because it can involve a lot of dangerous stuff [Justifying], if you miss click something, you may as well lose your career actually [Elaborating]. Fuad: Of course [Agreeing]. Aziz: What about the relationship that you create in social media [Suggesting]? Fuad: Relationship, yeah [Agreeing]! That's a great supporting sentence [Acknowledging].			Fuad: For conclusion, […] can you share me your opinion [Requesting]? Aziz: We can say whether you are looking for a new job or planning to have fun English is important nowadays. [Suggesting]. How about this one [Eliciting]? Fuad: But education is not mentioned [Disagreeing] maybe we can say you learn it for educational purposes… [Suggesting]? Aziz: Oh! Yes, we can also say "or if you learn it for educational purposes, English is important nowadays [Elaborating].			Aziz: Hey dude, now we should continue by talking about the villages [Suggesting]. Fuad: Yeah [Agreeing]. Aziz: Okay, check this out and tell me what you think [Requesting]. "The same cannot be said about villages because they tend to be really simple and with simplicity comes low security." [Suggesting]. What do you think? [Eliciting] Fuad: Great [Acknowledging], so now let's jump to the end of the paragraph. [Suggesting] Aziz: No, I think we should talk a little bit more about low security [Disagreeing].		
Writing change functions	▪ Self: 7 ▪ Other: 2	▪ Self: 6 ▪ Other: 3	13 [72%] 5 [28%]	▪ Self: 8 ▪ Other: 3	▪ Self: 5 ▪ Other: 5	13 (62%) 8 (38%)	▪ Self: 8 ▪ Other: 4	▪ Self: 8 ▪ Other: 5	17 (64%) 8 (38%)
Subtotal	9	9		11	10		12	13	
Example	Fuad: In the end, before you spend too much time on social media and want to escape the dark side of it [Adding, self] Aziz: ~~Before you spend too much time spending hours on social media and want to escape leave the dark side of it~~ [Deleting, other]. Fuad: Before spending too much time on social media. You need to try to take life conversations with your friends and loved ones [Adding, self]. Fuad: Then try to ~~take~~ have Real Life conversations with your friends and loved ones. [Rephrasing, self]. Aziz: Then try to have real life conversations [Correcting, other] with your friends and love ones.			Aziz: Some people can join the military to be interpreters so they may use the language in interrogations, and to communicate with a foreign ally [Adding, self]. Fuad: […] so they may use the language in interrogations, ~~and~~ or just to communicate with a foreign ally [Rephrasing, other]. Fuad: For example, using it for ~~online chatting~~, communication, online chatting, or understanding movies […] [Reordering, self]. Aziz: For example, using ~~it~~ English for communication, online chatting, or understanding movies […] [Rephrasing, other].			Fuad: An ambitious family also look for safe and security [Adding, self]. Aziz: ~~An ambitious family~~ Ambitious families also look for peace and security [Rephrasing, other]. Aziz: Moving to big cities is the best choice for people who are looking for that kind of life [Adding, self]. Fuad: Moving to ~~big cities~~ a big city is the best choice […] [Rephrasing, other] Fuad: […] since it usually has a ~~Po~~police department […] [Correcting, self].		

In addition, this mutual engagement in text construction was reflected in multiple instances of *self* vs. *other* writing change functions across tasks. For instance, in face-to-face interaction, they performed five (28%) *other* writing change functions, and their mutual contributions increased in the subsequent synchronous computer-mediated tasks, with eight (38%) instances of *other* writing change functions in text chat and voice chat, respectively. As shown in the face-to-face interaction example in Table 4, Aziz rephrased Fuad's input of the concluding sentence to make it more comprehensible. Elsewhere, Fuad corrected Aziz's linguistic accuracy of the word "love." Such joint responsibility and engagement in task negotiation and text construction suggested a high degree of mutuality throughout the composition process across communication modes.

(c). Pair 3

Unlike the other pairs, Pair 3 demonstrated an expert/novice pattern of interaction across all three communication modes. Sadun took on a leading role and acted as the expert, while Abdul remained in the novice role throughout (i.e., there was moderate to low equality and moderate to high mutuality). Although Sadun consistently initiated discussions, he guided, assisted, and encouraged Abdul to participate. Regarding equality, as shown in Table 5, Sadun contributed more to the tasks across modes without dominating the conversation. Instead, he assumed greater responsibility, as indicated by his language function acts (36, 22, 46) compared to Abdul (24, 17, 31) face-to-face, in text chat, and in voice chat, respectively. Sadun frequently attempted to involve Abdul in tasks by asking questions, inviting contributions, and providing explanations and justifications. In contrast, Abdul's language function acts were fewer and primarily limited to questions, requests, acknowledgments, and agreements. In the face-to-face example, for instance, Sadun asked Abdul to

share his opinion about the topic sentence by asking, "Tell me what you think?" and invited his contribution by saying, "Now you can give me a supporting sentence, Abdul." Such encouragement seems to have motivated Abdul to contribute to the texts mirrored in the instances of his writing change functions (5, 7, and 8) in the three modes.

TABLE 5
PAIR 3 LANGUAGE AND WRITING CHANGE FUNCTIONS

	Face-to-face			Text chat			Voice chat		
	Sadun	Abdul	Subtotal	Sadun	Abdul	Subtotal	Sadun	Abdul	Subtotal
Language functions	▪ INIT: 27 ▪ RESP: 9	▪ INIT: 11 ▪ RESP: 13	38 (63%) 22 (37%)	▪ INIT: 16 ▪ RESP: 6	▪ INIT: 8 ▪ RESP: 9	24 (62%) 15 (38%)	▪ INIT: 29 ▪ RESP: 20	▪ INIT: 20 ▪ RESP: 16	44 (55%) 36 (45%)
Subtotal	36 (60%)	24 (40%)		22 (56%)	17 (44%)		51 (61%)	31 (39%)	
Example	Sadun: First the topic should be social media is damaging our personal relationships [Suggesting]. Do you think it is good or you may help me shortness it more? [Eliciting] Abdul: Very good [Acknowledging], now we continue with the supporting sentence? [Questioning]. Sadun: No [Disagreeing], now we write the topic sentence [Suggesting] because this is only topic, the title [Justifying]. Abdul: Oh! Ok [Agreeing]. Sadun: For the topic sentence, we can say: social media could be a real danger on relationships [Suggesting], tell me what you think? [Eliciting] Abdul: It's nice topic [Agreeing/ Acknowledging].			Sadun: I will start with the topic sentence [Suggesting]. Abdul: No problem [Agreeing] Sadun: You can continue with supporting idea [Requesting]. Abdul: Ok I will write something now [Agreeing] Sadun: Okay nice [Acknowledging] Sadun: You can add because before English in the beginning of the sentence [Suggesting] Abdul: That's right [Agreeing] Sadun: Good I will write another supporting sentence now [Suggesting] and you can help me with it [Requesting] Abdul: Go ahead [Agreeing] Abdul: It's very good [Acknowledging]			Sadun: Ok, Like always I'll start the topic sentence. Ok, then here is some reasons [Suggesting]. Abdul: I think here are? [Suggesting] Sadun: Yup yup [Agreeing], thanks [Acknowledging]. Now we should put first second. You start with first then second, you start with the first supporting sentence. [Suggesting] Abdul: Ok, you think I can put comma here? [Eliciting] Sadun: Yes yes you should put comma and then continue. [Suggesting], it's difficult because this word is too long I know [Justifying].		
Writing change functions	▪ Self: 7 ▪ Other: 2	▪ Self: 4 ▪ Other: 2	11 [73%] 4 [27%]	▪ Self: 5 ▪ Other: 4	▪ Self: 5 ▪ Other: 2	10 (63%) 6 (38%)	▪ Self: 9 ▪ Other: 3	▪ Self: 6 ▪ Other: 2	15 (75%) 5 (25%)
Subtotal	9	6		9	7		12	8	
Example	Sadun: Social media could be a real danger on our relationships. [Adding, self] Abdul: Social media is addictive as taking drugs [Adding, self]. Sadun: Social media is as addictive as taking drugs [Correcting, other]. Abdul: Social media can be very fake. [Rephrasing, self] Sadun: It is also ~~S~~ social media can be very fake. [Rephrasing, other] Sadun: It make you lazier in the matter of visiting your relatives […] [Adding, self]			Abdul: English is the most commonly spoken language in the world [Adding, self] Sadun: Because English is the most commonly spoken language in the world [Rephrasing, other]. Abdul: English is the ~~ofi~~official language of 53 countries [Correcting, self]. Sadun: It's also an essential element that will help you through college, so be sure to study hard before entering the college [Adding, self]			Sadun: Here ~~is~~ are some reasons. [Correcting, self] Abdul: First, they will get lots of different job opportunities [Adding, self]. Abdul: Second, cities have lots of ty~~b~~pe of schools ~~wich~~ which may help to give kids better education [Correcting, self]. Sadun: Third, cities have some good shopping districts, shopping malls and plazas which will make shopping easier for any mother [Adding, self].		

Although equality was not high, both learners were actively involved in text construction, as reflected in their *initiating* and *responding* language functions and *self* and *other* writing change functions. The pair performed multiple instances of *responding* (37%, 38%, and 45%) to *initiating* (63%, 62%, and 55%) language function moves in face-to-face, text chat, and voice chat modes, respectively. As shown in Table 5, mutual effort was noticeable when interacting via voice chat as Sadun took the lead from the beginning by suggesting the topic sentence, and Abdul also engaged in the task by providing counter suggestions and eliciting the expert's opinion on punctuation use. Multiple instances of *other* writing change functions were observed, with four (27%) face-to-face, six (38%) in text chat, and five (25%) in voice chat. In constructing the sentences in the face-to-face example, Sadun added a topic sentence, followed by Abdul's supporting sentence. Their mutual engagement in task negotiation and text construction was thus evident in all tasks, suggesting high mutuality regardless of communication mode.

B. Interviews

(a). Pair 1

In the interviews, both participants in Pair 1 mentioned shared goals, such as improving the quality of their writing, avoiding dull phrases, and crafting well-structured paragraphs. Their approach to and interactions with these objectives guided each mode. To enhance his punctuation and structure, Ali aimed to broaden his perspective when discussing cases. Salim wanted to draw from Ali's vocabulary and ideas, noting that "working with Ali was easy and fun." Face-to-face collaboration involved building personal connections and brainstorming. For instance, Salim remarked that face-to-face communication "helps with writing 100%" because it employs body language and facial expressions. However, both indicated that this process was more time-consuming than voice chat. According to Ali, in the text chat communication mode, Google Docs gave him real-time manual feedback that he referred to as the best for collaboration, describing the

readability and mutable interface of Google Docs as "the best ever." Salim liked the tool's efficiency but felt text chat was not as good for detailed communication, and he preferred to speak to express himself better. Salim preferred voice chat because he found pacing and elaborating on his thoughts while walking stimulated creativity. Their collaboration across all modes was equal and mutually supportive in terms of participating and correcting each other's mistakes. Based on their experience, different communication modes worked well, but task topics should be clearly stated and collaboration iteratively refined.

(b). Pair 2

Aziz and Fuad's interviews revealed what they shared regarding their goals and collaboration across modes of communication. Aziz aimed to create an "impressive paragraph," while Fuad mentioned he was trying to "learn new words and grammar." Their positions mirrored their collaboration, as Aziz described himself as a "typer and suggester" addressing editing concerns, and Fuad commended the "good touch in the sentence" that Aziz contributed. In face-to-face interactions, they spent considerable time deliberating and refining ideas; Aziz rephrased Fuad's concluding sentence for clarity, and Fuad corrected Aziz's linguistic issues, such as fixing Aziz's use of the word "love." The ability to "think clearly" about what input to provide was crucial for Aziz in text chat, while Fuad stated that this mode made it simpler to achieve their goals. In voice chat, they shifted their focus to quicker communication. Aziz preferred this mode because it allowed him to "deliver ideas better and faster," while Fuad appreciated the immediacy and collaborative feedback during discussions. Fuad referred to it as a "two-man job," and Aziz expressed the "thrill of discussing ideas" with a classmate. Across all modes, they remained committed to achieving their goals through collaborative writing, which was evident in the mutuality and equality in all aspects of idea exchange, decision justification, and improvements to each other's contributions.

(c). Pair 3

In the interviews, Abdul said he developed his skills by rewriting sections, while Sadun said he enhanced his writing and vocabulary. The more experienced Sadun assumed a leadership role, aiming to "make [Abdul] comfortable" and guide the writing process without overwhelming him. Their opinions on face-to-face interaction were mixed, as Abdul felt nervous and preferred voice chat to hide his "facial expressions." Although Sadun enjoyed the experience, he preferred collaborating with familiar people. Both agreed Google Docs was an effective real-time collaboration tool for text chat. However, Abdul found using the text chat microphone challenging, while Sadun preferred voice chat for its immediacy and ease of expression. Sadun preferred voice chat and guided Abdul through tasks: "I think I did the teacher role…this is my personality." They both recognized the benefits of their collaboration despite their skill differences. Both noted areas for improvement, such as better preparation and clearer task instructions. Overall, their experiences showed that meaningful learning is possible with guidance, mutual respect, and the right tools, even with different skill levels.

V. Discussion

This study offers insights into Saudi EFL learners' interaction patterns during collaborative writing tasks across three synchronous communication modes: face-to-face, text chat, and voice chat. In light of the literature, this section evaluates the observed interaction patterns and role of communication modes in shaping collaborative dynamics, drawing on activity theory and related frameworks concerning peer interaction and language learning. The first research question concerned students' interaction patterns across the three communication modes. The most notable differences between modes occurred not in the interaction patterns themselves but in the characteristics of these patterns; the mode appeared to influence the quality and nature of the collaboration. This finding aligned with previous research indicating that interaction modes shape these patterns, as described by Storch (2002, 2005) in her typology of interaction patterns: collaborative, dominant/dominant, dominant/passive, and expert/novice. For instance, regarding face-to-face and voice chat modes, the findings corresponded with those of Rouhshad and Storch (2016), who found that face-to-face communication could increase engagement. In the face-to-face and voice chat tests of this study, Pairs 1 and 2 exhibited significant equality and mutuality, with both parties in a pair actively engaged in initiating, responding to, and writing change functions across both modes. The immediacy of voice-based interaction in voice chat, similar to face-to-face communication, may have led to higher interaction quality due to rapid exchanges, mutual feedback, and a sense of joint task ownership. This would align with Tan et al.'s (2010) findings that synchronous voice interaction could improve turn-taking and reciprocal engagement, fostering learning by encouraging learners to build on one another's work.

In the text chat mode, in contrast, Pair 3 displayed reduced mutuality and collaborative depth. Text-based exchanges through asynchronous channels tend to offer less immediate feedback, potentially disrupting idea flow and inhibiting turn-taking and engagement. This finding adds to previous research (e.g., Rouhshad & Storch, 2016) demonstrating that text-based synchronous computer-mediated communication may limit language-focused discussions and feedback compared to other synchronous modes. This construct was observed in the text chat context; however, the interaction style was more functional than relational. By highlighting this variation, the affordances of particular tools like text chat and their inability to fully replicate the immediacy and dynamic nature of face-to-face and even voice-based communication underscore the importance of carefully selecting communication modes in L2 education.

In contrast to the other two pairs, Pair 3 exhibited an expert-novice pattern across all modes, with Sadun taking on a leadership role and Abdul adopting a more receptive position. However, unlike typical dominant/passive dynamics, this pair exhibited high mutuality because Sadun actively engaged Abdul in decision-making. This finding aligned with Watanabe's (2008) research, which showed that pairs with varying levels of proficiency could achieve positive collaborative outcomes if a more proficient peer adopted an inclusive, supportive approach. In this instance, the expert/novice dynamic indicated that individual learner roles, rather than the mode of communication, greatly influenced interaction patterns.

The second research question explored whether learners' goals influenced their dyadic interactions. Drawing on Leont'ev (1978) and Engeström (1987), participants' goals in collaborative writing activities can be understood as key drivers behind their interactions, shaped by sociocultural contexts, tools, and rules. Interviews with the three pairs (Ali and Salim, Aziz and Fuad, and Abdul and Sadun) revealed how personal motives impacted their dyadic interactions in the face-to-face, text chat, and voice chat modes. These motives, both explicit (e.g., improving writing skills, vocabulary, and collaborative abilities) and implicit (e.g., building confidence and relationships), played a crucial role in shaping the processes and outcomes of the collaborative writing tasks.

From an activity theory perspective, participants' goals acted as object-oriented needs that propelled their actions within the wider sociocultural collaborative learning environment. For instance, Pair 1's collective efforts to exchange ideas and review each other's writing were guided by the shared explicit goal of avoiding repetition and crafting well-structured paragraphs. Ali's emphasis on punctuation and structure, coupled with Salim's aspiration to enhance his vocabulary and grasp grammatical nuances, underscored how their motives were influenced by their collaborative roles. Their success likely stemmed from their shared division of labor; however, both recognized that the task topics needed greater clarity and that iterative feedback was necessary for refinement. Furthermore, the dyadic interaction in Pair 2 illustrated Leont'ev's (1978) concept of collective and object-oriented collaborative writing. For example, Aziz aimed to create "an amazing paragraph," while Fuad's goal was to "learn new words and grammar," aligning with their mutual commitment to the task. The roles of the two participants in the writing process were dynamically allocated, with Aziz focused on correcting grammar and spelling and Fuad on generating creative ideas. Both Aziz and Fuad appreciated the tools (e.g., Google Docs), especially in the text chat mode, where Aziz valued its clarity for thoughtful composition, and Fuad highlighted its usefulness for easier editing and collaboration. Nevertheless, the interaction rules (i.e., mutual respect for each other's suggestions) and collaborative negotiation allowed both participants to reap similar benefits, fostering a sense of equality and shared responsibility.

The findings also emphasized the significance of the division of labor and tool mediation in achieving learners' goals. This was demonstrated by Pair 3, in which Abdul's explicit goal of enhancing his writing and vocabulary skills, paired with Sadun's leadership-oriented approach, signified distinct yet complementary object-oriented needs. While nurturing Abdul's learning, the unequal division of labor also highlighted the tension between individual agency and collective objectives. Abdul, for instance, noted his reliance on Sadun's contributions, while Sadun mentioned pacing his input to correspond with Abdul's skill level. The pair's use of tools (particularly Google Docs and Zoom) effectively mediated their collaboration, with Sadun preferring voice chat for its immediacy, as it helped alleviate nervousness by allowing him to conceal his "facial expressions".

The relationship between the participants (community), their goals (object), and their tools (Google Docs, WhatsApp, and Zoom) shaped the collaborative experiences of all three pairs. Implicit rules of engagement—respecting roles, giving feedback, and negotiating ideas—regulated their interactions and facilitated the collective nature of the activity. However, the distribution of labor and task effectiveness were influenced by individual differences in skill levels, preferences, and confidence.

Dyadic interactions between participants were significantly influenced by their goals, with their motivations affecting the division of labor, the use of tools, and adherence to rules within the activity. From an activity theory perspective, collaborative writing activities highlight the importance of aligning individual goals with collective needs, utilizing appropriate tools, and cultivating clear rules and a shared division of labor to enhance learning outcomes and collaborative writing practices.

VI. Conclusion

This study contributes to the literature by showing the importance of selecting communication modes based on the desired interaction patterns in EFL collaborative writing activities. For tasks that benefit from dynamic and high-level interactions, educators may wish to prioritize synchronous voice-enabled tools. In contrast, asynchronous or text-based modes could limit the immediacy and depth of involvement and might be more suitable for tasks that require reflection and slower-paced exchanges. Educating EFL students on engaging in collaborative tasks, particularly with asynchronous tools, is also expected to enhance the quality of interaction by fostering a collaborative stance, regardless of language proficiency level. Additionally, students with varying proficiency levels can be paired if the roles of each partner involve reciprocal engagement.

APPENDIX A. TAXONOMY OF LANGUAGE FUNCTIONS

Language Functions	Definitions & Examples
Acknowledging	Recognizing or praising others' ideas, comments, helpfulness, and capabilities. E.g.: Awesome man!
Agreeing	Expressing agreement with others' viewpoints. E.g.: Oh, that's right.
Disagreeing	Expressing disagreement with others' viewpoints. E.g.: No, I think we should talk a little bit more about low security.
Elaborating	Extending and elaborating on self or others' ideas about writing. E.g.: Oh! Yes, we can also say if you learn it for educational purposes, English is important nowadays.
Eliciting	Inviting or eliciting opinions, comments, etc., from group partners. E.g.: …, tell me what you think?
Greeting	Greeting group members. E.g.: Hey dude…
Justifying	Defending one's own ideas/comments by giving reasons. E.g.: We can say there are going to be more job opportunities because this is a very important reason for moving to a large city.
Questioning	Asking questions that one is not clear about. E.g.: Can we change the sentence a little bit?
Requesting	Making direct requirements or requests. E.g.: Good, good, let me do the conclusion and tell me what you think.
Stating	Stating one's ideas and the ideas groups have discussed earlier, posting writing content, or sharing information. E.g.: This task is about social media damaging our personal relationships. So the ideas will be about the negative of social media.
Suggesting	Offering suggestions/recommendations about writing content, structure, format, etc. E.g.: I will write this: having good English could be the boost.
Two main categories	
Initiating	Proposing new ideas or initiating group interaction. E.g.: Now, you can give me a supporting sentence Abdul
Responding	Reacting to others' ideas. E.g.: Umm.., "language and the language"? It doesn't sound good to me. Can we remove one of them?

APPENDIX B. TAXONOMY OF WRITING CHANGE FUNCTIONS

Writing change functions	Definitions & Examples
Adding	Contributing new content or adding information to existing content at different levels, in different forms. E.g.: Some people can join the military to be interpreters so they may use the language in interrogations, and to communicate with a foreign ally.
Deleting	Removing texts or existing information. E.g.: ~~Before you spend too much time spending hours on social media and want to escape leave the dark side of it.~~ [*sentence deleted*]
Rephrasing	Expressing existing ideas in an alternative way. E.g.: An ambitious family also looks for safety and security…. **Aziz**: Ambitious families also look for peace and security.
Reordering	Reorganizing ideas or moving around contents. E.g.: [*original*] First and foremost, living in a large city means more income, more opportunities, and a better lifestyle. [*reordered*] First and foremost, living in a large city means more opportunities, more income, and a better lifestyle.
Correcting	Correcting or attempting to correct mistakes in grammar, mechanics, and spelling. E.g.: Social media is as addictive as taking drugs. [*"as" is added before addictive*]
Two main categories	
Self	Writing changes made to the texts composed by the member himself/herself. E.g.: Sadun: Here ~~is~~ are some reasons. Sadun: Here are some reasons.
Other	Writing changes made to the texts composed by other group members. E.g.: Salim: Social media addition […]. Ali: Social media addiction […].

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