System 98 (2021) 102471

Contents lists available at ScienceDirect

System

journal homepage: www.elsevier.com/locate/system

The progression of collaborative argumentation among English learners: A qualitative study

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ARTICLE INFO

Article history:
Received 6 July 2020
Received in revised form 6 January 2021
Accepted 20 January 2021
Available online 25 January 2021

Keywords:
Collaborative argumentation
Development of collaborative argumentation
Blended language learning
Qualitative study

ABSTRACT

Argumentation, the process of making claims and using evidence and reasoning to support those claims, is essential to academic literacy. Collaborative argumentation is the social process of working together to construct arguments, and may benefit the development of students' argumentation ability. How collaborative argumentation in the L2 context progresses over time is largely unknown. To address this research gap, this study adopted a qualitative approach to examine how a group of college English learners engaged in collaborative argumentation in a blended learning context over the period of a semester. Analysis of the participants' face-to-face discussion, online collaborative writing, and interview data revealed the developmental trajectories of collaborative argumentation with regard to its structural, social, and linguistic aspects in both the face-to-face discussion and the online writing. In each phase of argumentation, students exhibited distinct features in argument structure and interaction patterns. The role of English as the second language shifted from impeding argumentation to facilitating argumentation over time. The findings contribute to a deeper understanding of the developmental model of students' collaborative argumentation and influencing factors, and inform the design of tailored pedagogical scaffolds in response to the developmental stages of collaborative argumentation.

1. Introduction

Argumentation is the process of making claims and using evidence and reasoning to support those claims and involves "the verbal, social, and rational activity" (van Eemeren, Henkemans, and Rootendorst 2002, p. 1). Argumentation is essential to achieving academic literacy and has thus drawn research attention (Coffin, Hewings, & North, 2012; Kobrin, Patterson, Shaw, Mattern, & Barbuti, 2008; Preiss, Castillo, Grigorenko, & Manzi, 2013). An essential aspect of academic literacy is argumentative writing, which is the written product of argumentation and has been the focus of academic English classes (Zhu, 2001). Argumentative writing rests on two pillars: a strong argumentation and the effective use of language to deliver the argumentation (Berland & McNeill, 2010; Jin, Su, & Lei, 2020). The existing plethora of studies on second language (L2) argumentative writing has focused primarily on developing the linguistic and structural features of argumentative writing

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https://doi.org/10.1016/j.system.2021.102471
0346-251X/

(e.g., Hirose, 2003; Liu & Braine, 2005; Ong & Zhang, 2010; Qin & Karabacak, 2010; Zhu, 2001). The process of constructing an argument, such as proposing a valid claim, supporting with appropriate evidence, and presenting logical reasoning process has, however, been less researched, but is a major challenge L2 learners face (Berland & McNeill, 2010; Jin, Shi, & Lu, 2019). It is argued that to facilitate L2 learners' argumentative writing, greater attention is needed to understand how to enhance learners' argumentation abilities.

Argumentation is fundamentally a social practice (Evagorou & Osborne, 2013). Thus, researchers resort to a collaborative argumentation approach that engages students in group work to construct an argument collaboratively to help them improve their argumentation ability (MacArthur, Ferretti, & Okolo, 2002; Reznitskaya, Anderson, & Kuo, 2007; Reznitskaya et al., 2001; Short, Van der Eb, & McKay, 2020). In the L2 learning context, Jin et al. (2020) proposed a dialogue-to-writing approach to collaborative argumentation that progressed from group discussion to collaborative writing. The researchers found that this approach enhanced Chinese university English language learners' argumentative writing in both content and language. How collaborative argumentation among L2 learners evolves over time is, however, unknown. Unraveling the process of collaborative argumentation can help L2 teachers and researchers to understand the interaction among argument construction, argumentative interaction, and language learning and to identify the factors that influence students' collaboration, which could inform supporting mechanisms of argumentation in L2 instruction (Zhu, 2001). In this study, therefore, we examined how a group of L2 learners worked together in a blended learning context to collaboratively construct an argument, i.e., what took place in the process of collaborative argumentation, and how the process changed or developed over the course.

2. Research background

2.1. Understanding argumentation

Argumentation is a reasoning process that promotes problem-solving and knowledge building (Duschl & Osborne, 2002; van Eemeren, Henkemans, & Grootendorst, 2002). The product of argumentation is an argument, which might be in oral or written form (Berland & McNeill, 2010). Evident from the definition, argumentation entails both "a structural meaning and a dialogical meaning" (McNeill & Knight, 2013, p.938). Accordingly, in analyzing argumentation, both the structural and social dimensions of argumentation should be considered (Lu, Chiu, & Law, 2011).

Toulmin's argumentation pattern (TAP) laid the foundation for understanding the structural dimension of argumentation (Nielsen, 2013). According to this theory, the structural components of argumentation include claim, data, warrant, backing, rebuttal, and qualifier (Toulmin, 1958). McNeill and Krajcik (2009) further simplified the model into claim, evidence, and reasoning (CER) because TAP was too complex to be employed in classroom tasks. Although laying out the structural components of argumentation, CER does not speak to the argumentation quality. Subsequent researchers evaluate the quality of argumentation by examining the completeness of argument components, scrutinizing the number of argument components that requires higher-order thinking, and analyzing the characteristics of the components, such as sufficiency and relevance (e.g., Berland & McNeill, 2010; Erduran, Simon, & Osborne, 2004).

The social aspect of argumentation indicates that argumentation takes place in social contexts, and the features of social activities influence the results of argumentation (Osborne, Erduran, & Simon, 2004). Analyzing interactions in argumentation is, therefore, essential. The argumentation interactions incorporate discourse moves, such as stating, challenging, supporting, defending, elaborating, and revising (Chin & Osborne, 2010a). By analyzing the social process of oral argumentation and the written product of argumentation, Evagorou and Osborne (2013) identified three discourse patterns in social interaction: (1) the explorative talk characterized by constructive and critical interactions, (2) the dispute talk characterized by competition and disagreement, and (3) the cumulative talk characterized by repetition and agreement. The researchers found that the more successful groups utilized more explorative talks, and engaged more deeply with each other's ideas by questioning, than the less successful ones.

From a linguistic perspective, both spoken and written argumentation involves a string of language use activities (Klein, 2006). In social activities like argumentation, language is a medium, a facilitator, and an integral part of the activities (Duschl & Osborne, 2002). The language proficiency level of students might influence their argumentation. For example, in the study of Berland and McNeill (2010), students were found to exhibit stronger ability in oral argumentation than written argumentation. Therefore, it is also necessary to understand the role of language in analyzing argumentation.

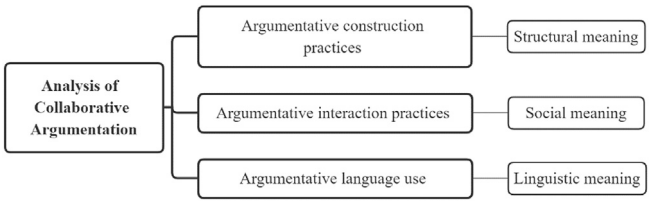

Fig. 1. Theoretical framework of analyzing collaborative argumentation.

Taken together, by investigating the argument structure, social interaction discourses, and the role of L2 language use, it is possible to get a clear idea about the process of argumentation. The structural, social, and linguistic aspects of argumentation form the theoretical framework of this study (see Fig. 1).

2.2. Argumentation and L2 learning

The close interaction between argumentation and L2 learning is manifested in two aspects. On the one hand, argumentation underlies language learning and is an indicator of one's language abilities. Through the process of confirming or rejecting claims, finding and evaluating evidence, and rebutting counterarguments, students transform everyday language, or what they have in mind, into organized and abstract symbols (Chen, Park, & Hand, 2016; Choi, Hand, & Greenbowe, 2013). This process promotes the development of language since language learning is essentially a meaning-making process with language (Lee & Stephens, 2020). In addition, argumentation is essential to one's academic writing ability (Coffin et al., 2012; Preiss et al., 2013; Zhu, 2001). Argumentative writing is an indicator of academic English, and has been used in high stake exams, such as TOEFL and IELTS to gauge L2 learners' level of academic literacy to study at English-medium universities (Coffin, 2004; Coffin & Hewings, 2004).

On the other hand, argumentation is an indispensable aspect of effective language use (Martin, Martin, & Halliday, 1993). Language is the tool for argumentation (Yore & Treagust, 2006), and problems with L2 use might hinder the construction of a well-developed argument (Al-Haq & Ahmed, 1994; Barton, 1995; Bychkovska & Lee, 2017; Hirose, 2003). L2 learners face an additional layer of the challenge in argumentation because of their limited proficiency in the target language, such as the discrepancy between L2 organization conventions with native languages (Hirose, 2003), the inappropriate use of cohesive devices (Barton, 1995), and the improper use of articles and prepositions (Bychkovska & Lee, 2017).

2.3. Collaborative argumentation: justifications and implementation

Language learners, both L1 and L2 learners, are often found to struggle with making well-developed arguments (Wagner, Ossa Parra, & Proctor, 2017). Some students may fail to consider multiple perspectives (Chin & Osborne, 2010b), and to provide adequate evidence that is reliable and relevant (Hogan & Maglienti, 2001; Sandoval & Millwood, 2005). Others are found to lack the ability to analyze their evidence, especially when the evidence contradicts their previous beliefs (Masnick, Klahr, & Morris, 2007), and to organize their ideas and present explicit and logical links between the evidence and the claim, i.e., reasoning (Jiménez-Aleixandre,Bugallo Rodríguez, & Duschl, 2000; McNeill, Lizotte, Krajcik, & Marx, 2006; Zhu, 2001). Many students also do not know how to use rebuttals or counterarguments in their argumentation (Bell & Linn, 2000). To address these challenges, scholars advocate collaborative argumentation practices, written and/or oral, in which students seek to collaboratively probe into the focal issue and work together to construct arguments (Nussbaum, 2008). Collaborative argumentation may increase students' attention to multiple perspectives by raising their audience awareness and exposing them to divergent perspectives, and stimulating them to reconcile different views by forming integrated arguments, which fosters comprehensive elaboration and improves the quality of their arguments (Driver, Newton, & Osborne, 2000; Morris et al., 2018; Wagner et al., 2017). Collaborative argumentation is also conducive to the co-construction of knowledge. It enhances content knowledge by engaging learners to continually exchange ideas, and to specify or revise their positions in group discussions (Leitão, 2000; MacArthur et al., 2002; Short et al., 2020). It also boosts language knowledge by offering students a context for meaningful, productive and communicative tasks, i.e., to "'do' things with language" (Lee, Quinn, & Valdés, 2013, p. 227).

Previous studies have further shown that the benefits of collaborative argumentation are subject to various factors (Noroozi, Weinberger, Biemans, Mulder, & Chizari, 2012; Veerman, Andriessen, & Kanselaar, 2002). These factors include student-related factors, such as gender, personality, and prior experiences (Noroozi, Kirschner, Biemans, & Mulder, 2018; Prinsen, Volman, & Terwel, 2007); learning environment-related factors, such as resources and settings (Noroozi et al., 2018; Strijbos, Martens, & Jochems, 2004); and learning process-related factors, such as the interaction patterns in class and teachers' guidance (Veerman et al., 2002). The implementation mechanism and the medium might be yet another factor that influences the effectiveness of collaborative argumentation.

Collaborative dialogue and writing are two essential tools for collaborative argumentation (Jin et al., 2020). Collaborative dialogues could bridge the gaps between students' thoughts and written arguments, and consensus-seeking dialogues can moderate individuals' one-sided views (i.e., the tendency to search for, or interpret, information as evidence based on one's personal belief or prior knowledge) in argumentative writings (e.g., Felton, Crowell, & Liu, 2015; Kuhn, Hemberger, & Khait, 2016; Shi, Matos, & Kuhn, 2019). Collaborative writing enables students to organize and refine their ideas collaboratively, and thus are conducive to argumentation (Villarreal & Gil-Sarratea, 2020). These two tools can be integrated via a blended learning approach. In a blended learning design, collaborative dialogues can be conducted orally face-to-face to facilitate the quick construction of group awareness and timely idea exchanges (Garrison & Vaughan, 2008; Mcalister, Ravenscroft, & Scanlon, 2004), which may enhance students' willingness to argue (Coffin & O'Halloran, 2009). Collaborative writing can be carried out online for easy tracking of revision history (Li & Zhu, 2017), alleviation of the personality barriers for communication such as shyness (Abrams, 2005), and the provision of more time for the construction of more thoughtful argumentation (Coffin & O'Halloran, 2009) and the presentation of more coherent and accurate argumentation both content-wise and language-wise (Elola & Oskoz, 2010; Kost, 2011). Previous studies have shown that the blended designs of

collaborative argumentation are effective in enhancing students' argumentation quality (Jin et al., 2020; Kathpalia & See, 2016). These studies, however, did not shed light on how collaborative argumentation progressed in the blended designs.

2.4. Research purposes

Given the limited understanding of how collaborative argumentation evolves in the L2 context, the aim of this study was to fill the research gap by examining how a group of Chinese university English learners engage in collaborative argumentation in a blended learning context that consisted of an in-class face-to-face collaborative dialogue phase, and an out-of-class online collaborative writing phase (Jin et al., 2020). Understanding the developmental process of collaborative argumentation in blended learning design, including the changes in argument structures, interaction patterns, and language use, helps reveal the challenges students may encounter at different stages, the relationship between those stages, and the influences of different factors (Berland & McNeill, 2010; Deane & Song, 2015). The following research questions were addressed:

1. How does the argumentation during face-to-face collaborative dialogues progress over time?
2. How does the argumentation during online collaborative writing progress over time?

3. Methods

3.1. Instructional context

The current study was based on an academic English course offered to first-year L2 students at a university in Southern China from September 2019 to January 2020. One of the main objectives of the course was to enhance students' argumentation ability. To this end, the course adopted a blended learning approach to collaborative argumentation. The pedagogical cycle consisted of face-to-face collaborative discussion, online collaborative writing and peer evaluation (see Fig. 2). Face-to-face discussion was conducted in class, whereas collaborative writing and peer evaluation was mediated by a wiki-based online platform (see Fig. 3). The learning activities were carried out collaboratively in groups of 5–6 students.

The face-to-face discussion started with students' reading an essay selected from *Science* and sharing individual interpretations of the reading among the team to reach a common understanding. Based on the common understanding, students then constructed their own arguments. The discussion lasted 15 min. Students were allowed to choose their preferred language for discussion to encourage a free flow of ideas and opinions. It turned out that most of them chose to use Chinese. Group representatives then briefly presented the group's consensual argument in English orally.

In the online writing stage, each group representative first summarized the group's consensual argument, and then all the group members were given one week to flesh out and revise their written argument collaboratively. The term "collaborative" is used in the sense that each group member was responsible for and shared ownership of the writing products. This was different from the peer review activities in which some students only provide feedback or suggestions but do not share authorship of the writing (Woo, Chu, & Li, 2013). The collaborative writing activity was undertaken in the Collaborative Writing Module. All the editing history of the writing was saved automatically on the platform. The users could easily track and compare different versions of the writing.

After generating their essays through collaborative argumentation, students were provided with machine-generated feedback on group members' participation and text complexity of their essays in the Machine Feedback Module, upon submitting their essays. They were also instructed to do the cross-group evaluation of one another's essays through in-class discussions and after-class online ratings in the Peer Feedback Module of the online platform. Their ratings and justifications were uploaded to the platform by the teaching assistant. Based on the results of machine feedback and peer feedback, a recommendation list of each writing topic was generated in the Essay Recommendation Module. All students' writings were

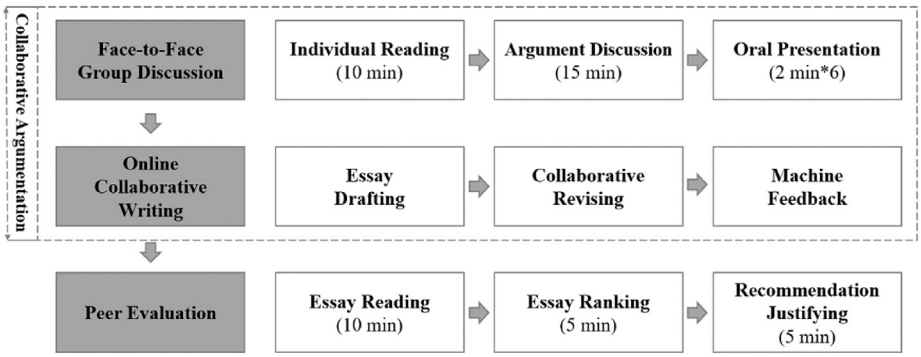

Fig. 2. Pedagogical cycle.

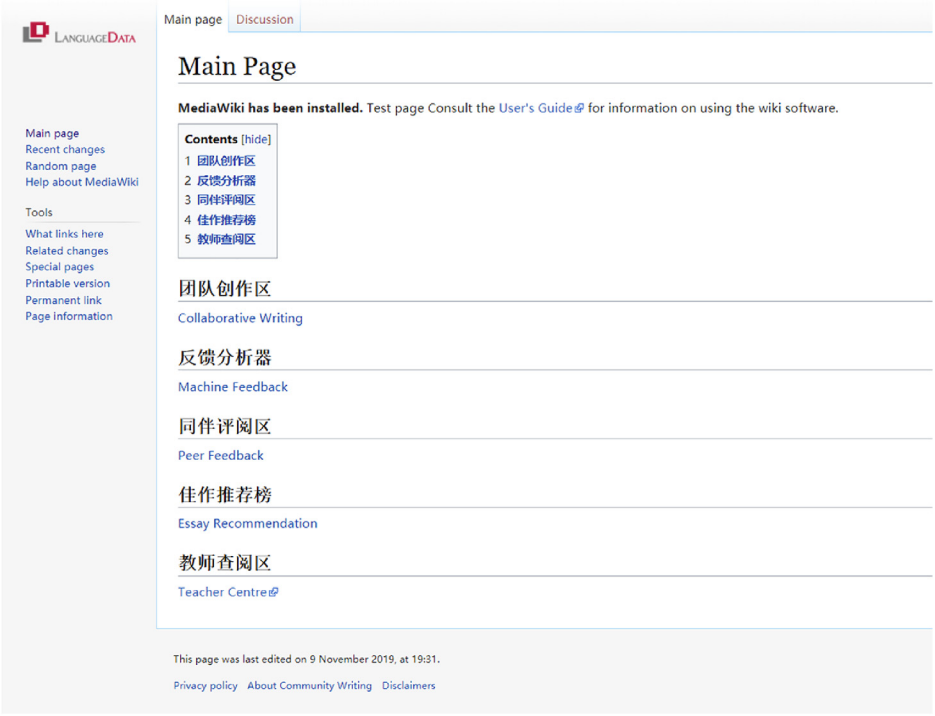

Fig. 3. The wiki-based online writing platform.

accessible to the teacher in the Teacher Centre Module. Since students formed their arguments during the face-to-face discussion and online writing, these two sessions are the focus of the current study.

There were, altogether, six writing topics throughout the semester. Each writing topic followed the same pedagogical cycle of face-to-face discussion, online writing, and peer evaluation. The teacher served as a facilitator who guided students to participate in learning activities and offered scaffolding when necessary. He also occasionally gave feedback on students' collaborative argumentation. The topics and the teacher's instruction of each writing topic are shown in Table 1.

3.2. Participants

A case study approach was adopted to provide an in-depth description of collaborative argumentation in the blended learning context (Miles, Huberman, Huberman, & Huberman, 1994). The first researcher selected a focal group of six members after observing students' performance in the first writing topic, which lasted three weeks, and tracked this group in the following five topics. The group was selected purposively for their relatively equal and active participation (Miles et al., 1994). In this group, students took turns to share their own ideas, and proactively responded to each other in group discussions. Equal participation can help ensure that the argumentation process is collaborative, rather than being dominated by "expert" students (Storch, 2002). Active participation provided a context for various argumentative moves, contributing to the ongoing development of their collaborative argumentation (Kuhn, Shaw, & Felton, 1997). These two features were crucial since the presence of collaboration and the occurrence of development are the basis for examining the progression of collaborative argumentation. Before data collection, students' consent to participate in the study was obtained, and all names used in this article were pseudonyms.

Table 1
Course outline.

Unit	Writing Topic	Teacher's Instruction
1	Career paths	A brief introduction to argument structure.
2	The power of extensive reading	No explicit instruction.
3	The top-down writing approach	Illustrated argument structure with simple examples.
4	Focus and persistence	No explicit instruction.
5	Effective decision making	Reviewed the argument structure, and emphazed on defining concepts and taking stances.
6	Independence and interdependence	No explicit instruction.

Among the participants, five were Chinese students, and one was Vietnamese. All the students had achieved the intermediate-advanced English proficiency level in the English placement test administered by the university. The Vietnamese student also had a good command of Chinese (Pass at HSK Level V) and could understand almost all the instructions delivered by teachers and discussions within her group. The profile of each participant is specified in Table 2, including gender, nationality, major, relevant learning experience, and English proficiency level.

3.3. Data collection

The study focused on students' collaborative argumentation developed in face-to-face discussion and online writing. Multiple data sources were collected, including: (1) audio recordings of group discussions which were transcribed verbatim; (2) different versions of collaborative writing products; (3) machine feedback and peer evaluation results on the online platform; and (4) semi-structured interviews with the participants which probed into their prior learning experiences, critical issues in collaborative argumentation practices, and reflections and suggestions of collaborative argumentation practices, respectively (Seidman, 2006). A total of 560 min of interview data were audio-recorded and transcribed. The primary data for analyzing the process and progression of students were group discussions and collaborative writings. The machine feedback, peer evaluation results, and the interviews were used for triangulation and to probe into the reasons for their changes, or development, in the collaborative argumentation.

3.4. Data analysis

The group discussion data were analyzed to answer the first research question. The data were analyzed via four steps. First, all the transcriptions of group discussions were broken into idea units as the analysis units. An idea unit is clauses or sentences that present distinct meaning along with their justifications (Brantmeier, Strube, & Yu, 2014; Kuhn, Zillmer, Crowell, & Zavala, 2013). For example, in group discussions, one student said: "I think he means that we should read books to make preparation. He means to make preparation." The two sentences above could only be counted as one idea unit because they share similar meanings. Then, the offline discussions were coded using the coding scheme of argument construction practices (see Appendix) to understand the structural aspect of argumentation. The coding scheme was based on the CER framework of McNeill and Krajcik (2009), and the specific codes came from the iterative analysis of data (Srivastava & Hopwood, 2009). Thirdly, students' interactions in face-to-face discussion, including proposing, supporting, challenging, checking, defending, elaborating, and revising, were coded to understand the social aspect of argumentation by using a coding scheme adapted from the framework of Chen et al. (2016) and the framework of Evagorou and Osborne (2013). Finally, the foci of argument construction practices and argumentative interaction practices in different writing topics were compared. Students' presentations and interview transcripts related to their reflections or comments on the group discussions were also analyzed for triangulation.

To answer the second research question, all the revising histories on the online platform were analyzed, the unit of analysis being each revision students made. First, using the same coding scheme of argument construction practices, the focuses of argument construction practices were identified. Secondly, the argumentative interaction practices of online writings were analyzed. Drawing on the writing change functions of Li and Zhu (2017), the coding scheme for online writings consisted of adding, deleting, rephrasing, elaborating, and correcting. Since this study was conducted in the language learning context, revisions related to language use, such as word choice, sentence structure, cohesive devices, and grammar, were also coded and analyzed. Finally, the results of different writing topics were compared, and interviews about their online writing practices and peer evaluation were also analyzed.

To ensure intra-coder reliability, the data was coded a second time, after a one-month interval, by the main researcher. The intra-coder agreement for group discussions and online writings was over 96%. Then subsequent to the coding by the main coder, a second coder, a research assistant who had been trained on the coding schemes, coded 20% of the data. The inter-coder agreement was over 90%. Discrepancies were resolved through discussions.

Table 2
Profile of the participants.

Name	Gender	Nationality	Major	Relevant Experience	English Proficiency
Carol	Female	Chinese	Law	None	Good
Heather	Female	Chinese	Law	None	Good
Linda	Female	Chinese	Law	Had written English argumentative writings.	Good (IELTS 7)
Eaton	Male	Chinese	Law	None	Good
Mina	Female	Vietnamese	Law	Had learned the argument structure.	Good (IELTS 7.5)
Zena	Female	Chinese	Law	None	Good

4. Findings

4.1. Progression of collaborative argumentation in the face-to-face stage

In general, the dialogic construction of collaborative argumentation focused on planning and organizing the outline of the argument. Analysis of their discussion discourses at different times of the semester suggests that students gradually incorporated all the argument components, i.e., claim, evidence, and reasoning, in their discussion over time, and the foci of the discussion shifted from claim to evidence (see Table 3). Students became less nervous about using L2 in argumentation over time. The progression of collaborative argumentation could be divided into three phases: (1) the explorative phase, represented by the writing topic 2; (2) the progressive phase, salient in the writing topics 3 and 4; and (3) the consolidated phase, reflected in the writing topics 5 and 6.

4.1.1. Explorative phase of collaborative argumentation

In this phase, the students relied heavily on the text's ideas and failed to connect their evidence with the claim, thereby ignoring the element of reasoning. As explained in the interview by Heather, before taking this course, most of them had never received systematic training regarding argumentation, and thus had limited knowledge about argument structure and did not realize the necessity of making connections between evidence and claim.

The group discussions centered on claim comprehension. Students spent most of the time discussing their reading content, *challenging* each other, and *defending* their own understandings. The excerpts from group discussions in Topic 2 illustrated their argumentative process of comprehending the reading material (see Table 4).

The claims the participants produced in this phase were often direct quotes from the reading material rather than self-composed propositions. As a result, their claim formation was basically a process of selecting the most appropriate sentence from the reading material. Each member shared the sentence they found, and they had discussions to determine one sentence as their claim. Reasons for supporting the claim in claim delineation practices were also taken from the reading material. Carol mentioned in the interview: "It seemed we have a tacit agreement on the author's claim even though we might have a different understanding."

After students agreed on the claim, they started to select relevant pieces of evidence. The discussions of evidence use went through evidence description, evidence selection, and evidence elaboration. The students did not, however, evaluate the evidence critically, and the whole process was relatively harmonious without much debate.

Their argumentative interaction practices consisted primarily of *proposing* their ideas, *challenging* others' ideas, and *elaborating* their ideas. *Challenging* and *defending* dominated the discussions around the claim, and *proposing* and *elaborating* were most often used when they moved to select evidence.

Their limited English ability impeded their collaborative argumentation. At the beginning of the semester, Eaton noted in the interview that he was "nervous about finishing reading the essay within 5 min," and could not get a full picture of the essay when asked to start the group discussions. Consequently, students spent a lot of time in claim comprehension, and found it challenging to decide on the sentence that could serve as the claim. Since they did not collaboratively discuss the wording of their argumentation, the group presenter Zena experienced high pressure when organizing the argumentation in English. As a result, she stammered in the presentation, and did not finish it within the time limit.

4.1.2. Progressive phase of collaborative argumentation

In this phase, all the argument components, namely, claim, evidence, and reasoning, were incorporated in the discussions. This might be prompted by the brief instruction on argument components with simple examples that the instructor provided in Topic 3. However, students constructed arguments as discrete components and discussed each component separately, although they did manage to finish reading the essay within 5 min. Language use was not a focus of their discussions.

Concerning argument construction practices, when discussing the claim, students shifted from claim comprehension to claim delineation. While students still looked for the claim and supporting reasons from the reading material, they did not use the original sentences directly. For example, in Writing Topic 3, Linda summarized the author's opinions in her own words.

Table 3
Coding results of offline argumentative practices.

Argumentative Practices	Explorative Phase	Progressive Phase	Consolidated Phase
Claim Comprehension	22	23	15
Claim Extraction	16	14	24
Claim Delineation	8	19	30
Evidence Description	6	27	6
Evidence Selection	9	20	31
Evidence Elaboration	14	15	48
Reasoning Identification	0	2	12
Reasoning Analysis	0	0	0
Reasoning Extension	0	0	0

Table 4
Transcript of argumentative discourse in Topic 2.

	Translated Transcript	Argumentative Practices	Discourse Functions
Zena	However, I think he means we should read to make preparation. Preparation is the key point, not reading. Before he did an experiment, he also needed many other resources other than books.	Claim Comprehension	Challenging
Eaton	He also listened to many talks.	Claim Comprehension	Supporting
Zena	This is what I mean.	Claim Comprehension	Defending
Eaton	But it did not mean that … I think the author still emphasizes reading.	Claim Comprehension	Challenging
Heather	I think he focused on reading, not preparation.	Claim Comprehension	Challenging
Carol	The title of this essay is *Fortune favors the well read*, so he emphasized on reading to make preparation.	Claim Comprehension	Defending

"In summary, because academic papers are always professional, using the Hollywood way can make paper-writing more vivid …"

This change might indicate their enhanced argumentative knowledge. As Eaton explained, they should not list all the author's claims but instead summarize the most central claim. Otherwise, they would be easily distracted by the trivial points, which was detrimental to their collaborative argumentation.

In this phase, most attention was paid to evidence use, especially evidence description and evidence selection. Students went through brainstorming of evidence after describing the kind of evidence they needed for their argumentation, which was reflected by the frequent occurrence of *proposing* in their discussions. They did not, however, specify their reasons for disposing of specific evidence. The elaboration of evidence was often made by the student who proposed it . In addition, students began to make connections between evidence and claim, but they did not go through the practices of reasoning analysis or reasoning extension.

As for the interaction practices in this phase, students were active in *proposing* new ideas, *supporting* each other, and *elaborating* their ideas without *challenging* other students in discussions over the claim. *Proposing* was the primary discourse function in evidence use and reasoning building. The Vietnamese student, Mina, said that her Chinese partners came up with many different examples. *Checking* the comprehension of the evidence, *challenging* its relevance, and *elaborating* the evidence occurred occasionally. Overall, students seldom argued with each other.

As for language use, students did not spend much time clarifying the words in the reading material or discussing the wording of their argumentation. Therefore, L2 did not play an important role in their collaborative argument construction process.

4.1.3. Consolidated phase of collaborative argumentation

In this phase, students not only became familiar with the tasks but also had an intense knowledge of argument structure. This change might be associated with the elaborated explanation on effective argumentation that the instructor provided, and the in-class display of collaborative argumentation models from peer students in Topic 5.

As for the argument construction practices, students attempted to connect different argument elements rather than discuss each component in isolation. In this phase, students focused on claim proposition, evidence use, and reasoning building in group discussions. Overall, they spent a relatively balanced time proposing their own claim and selecting the evidence but less time in reasoning building. It is noteworthy that the students constructed their own claims, looking for reasons and selecting evidence, and modified their claims by actively looking for counter-evidences. Some also mentioned considering alternative perspectives under the encouragement of the teacher, as Linda commented:

> "The teacher told us that we did not need to agree with the author. It's OK whether we agree or disagree with the author."

Table 5 showed how they revised the original claim according to the new evidence proposed after the argumentative discussions. In this phase, evidence use was closely related to the claim proposition and reasoning building. The identification of reasoning was made in the evidence selection process. However, due to the time limit, no reasoning analysis or reasoning extension practices were incorporated. In the process of elaborating evidence, the group members collaboratively contributed to adding more details to the evidence by searching for information. As Heather mentioned in the interview, she would search for more details on the Internet when her group members proposed new pieces of evidence. The elaboration of evidence was no longer dependent on the contribution of one or two individuals, but their collective work.

Students also went back to discuss the reasons that supported the claim after they proposed a piece of evidence. Carol, Zena, and Eaton noted that they wanted to make sure that their evidence and claims were interrelated. While Linda attributed such a change in group discussions to the peer evaluation tasks in which she learned from other groups' works, she realized that the argument components were not self-contained but interrelated with each other. She would then reflect on her use of evidence and the proposition of claim in later activities. Like in the previous phase, the students did not center on language use in group discussions.

Table 5
Transcript of argumentative discourse in Topic 5.

Participant	Translated Transcript	Construction Practice	Interaction Practices
Carol	You will not make any bad decisions if you embrace uncertainties.	Claim Comprehension	Proposing
Eaton	This is not for sure.	Claim Extraction	Challenging
Linda	We can partly agree with the author, and use "however …".	Claim Extraction	Supporting
Eaton	That's right. Because we need to make a logical judgment before making decisions, rather than an instinctive response.	Claim Delineation	Defending
Carol	All right, we use "however".	Claim Extraction	Revising
Eaton	I think this is not certainly the case that as long as you be true to yourself, you can make good decisions. For example, I decided to be a movie director. However, half a year later, I can't even feed myself now.	Claim Delineation & Evidence Selection	Elaborating Proposing
Carol	This is too casual. We need to consider lots of other issues.	Claim Extraction	Supporting & Elaborating
Mina	He didn't even think about his family.	Claim Extraction	Elaborating
Eaton	So, we need to find a balance.	Claim Extraction	Defending

Regarding the argumentative interaction practices, *proposing*, *elaborating*, *checking*, and *challenging* of ideas took place frequently in this process. This showed that students engaged more in argumentative discourses featured by spontaneous mutuality and conflict-solving.

4.2. Progression of argumentation in online writing

Online writing involved elaborating and reviewing the arguments that the participants constructed collaboratively during the face-to-face discussion. During the online writing phase, revisions related to the content of argumentation increased gradually, and the most frequently occurred practice was claim delineation (see Table 6). The interaction practices also reflected an increasing mutuality with each other's revisions. The role of language in online writings also shifted from inhibition of argumentation to facilitation of argumentation. Based on the changes of foci on argument construction practices, argumentative interaction practices, and the shifting role of language as evidenced by the coding results and triangulated with interview data, the progression of argumentation in online writing were categorized into three phases, i.e., the completion-driven phase (the writing Topic 2), the quality-driven phase (the writing Topics 3 and 4), and the holistic-driven phase (the writing Topics 5 and 6).

4.2.1. Completion-driven phase of collaborative argumentation

As the name indicated, in writing Topic 2, collaborative argumentation online was driven by the students' need to finish their homework. This phase was dominated by revision moves such as *adding, rephrasing and correcting*. Students worked more independently than collaboratively. The participants focused on *adding* new elements to the written argument, *correcting* grammatical mistakes, and *rephrasing* word choice. They reported that those revision moves were primarily driven by their desire to finish the task and to increase the scores of machine-generated feedback. Quite a lot of revision moves were made without a holistic understanding of argumentation structures.

Adding was the most frequently occurred writing change function in revising the content of argumentation. The participants added new evidence during online writing. The central claim of the team's argumentation was to "read widely to prepare ourselves for whatever might come up." In addition to the evidences the team came up with during face-to-face discussion, Heather and Eaton added two additional pieces of evidence. However, these two additions were irrelevant and barely supported the sub-claims of the argument. Heather acknowledged in the interview that her addition of a new paragraph did not follow the logical flow of the original writing. The *adding* primarily took place at the evidence level. In the rare cases where the addition was made on other argument construction practices, the participants reported doing it haphazardly with reasons not directly related to improving the writing. For instance, Linda added some new perspectives to their

Table 6
Coding results of online argumentative construction practices.

Argumentative Practices	Completion-Driven Phase	Quality-Driven Phase	Holistic-Driven Phase
Claim Comprehension	0	1	0
Claim Extraction	1	5	8
Claim Delineation	4	13	23
Evidence Description	0	1	0
Evidence Selection	2	2	2
Evidence Elaboration	2	3	3
Reasoning Identification	2	2	4
Reasoning Analysis	2	1	0
Reasoning Extension	2	0	6

argument at the end of the writing, which lessened the strength of their original claim. She explained that the urge to complete the task prompted such a practice:

"The deadline was coming, and I did not know what I could revise, but I had to revise a certain number of words."

Carol also added some elements of reasoning in revision with only a vague idea of what reasoning was. She reported that the unintentional behavior was driven primarily by the impulse to write more words. Such unintentional behaviors ranged from identifying the links between evidence and claim, analyzing the links in detail, to making real-life inferences or implications, even though no supplementary instructions were provided to students after class. Incorporating reasoning could also be attributed to the prolonged time for thinking in online writing, which enabled students' in-depth thinking and reconsideration of offline argumentation (Wigglesworth & Storch, 2012).

Besides evidence selection and evidence elaboration, the participants made iterative revisions of the language use, especially word choice, to get a higher text complexity index on the platform. Some group members were obsessed with substituting commonly-known vocabularies with more sophisticated alternatives. Many of their revisions were unnecessary and even inappropriate, and which even obstructed the presentation of their argumentation. Carol told the researcher:

"I would constantly refer to the complexity change index in revising the language, even though I sometimes knew that the substitution of words was not appropriate …. If the index decreased after my revisions, I would feel very depressed."

Their obsession with improving the complexity of language use distracted their attention away from the construction of argument and thus hindered their collaborative argumentation.

4.2.2. Quality-driven phase of collaborative argumentation

In Topic 3 and 4, students progressed to the quality-driven phase of collaborative argumentation. In this phase, they made revisions more out of the need to increase the argumentation quality rather than improving the index scores or from being under completion pressure. They made revisions on a broader range of argumentation practices.

The participants attributed this change to their enhanced awareness of effective argumentation structure after accessing their peers' works in the previous writing topics. For example, Eaton and Mina criticized the excess and unnecessary details of the evidence use. Mina also suggested using less advanced vocabulary in their online writings. Zena spoke highly of one group's writing in which the students clearly and logically presented the core components in their argument. The intrinsic motivation to improve their works to match up to good argumentative writings motivated their desire to revise.

The students' revisions focused more on claim construction and claim delineation in this phase. Students used various methods to lead in their claim, such as referring to one's relevant personal experience and asking rhetorical questions. In both cases, the writings were characterized by more claim delineation with more logical and substantive reasons to justify the claim. Students showed a certain degree of engagement in claim construction practices by elaborating on the claim proposed by previous writers. The contributions, however, were not equally distributed, and the claim delineation was completed mainly by the first drafter.

In revising evidence, students attempted to avoid redundancy in evidence use. In Topic 3, the first drafter changed the evidence the team came up with during group discussions because she thought it was inappropriate. In Topic 4, Heather corrected the mistake in evidence and added a contextualized elaboration. Mina also added pictures to their evidence to present the argument in multimodal formats, which was also a technique learned from other groups. The argument construction practices indicated that students made revisions more spontaneously. The mutual engagement of revisions increased to some extent, reflected by the increasing use of writing change function *elaborating*, but such a mutuality was limited. The changes students made to the contributions of other group members were not substantial or significant. Reasoning was not the focus of their argumentation in this phase, for although they could identify the links between evidence and reasoning, they neither analyzed it in detail nor made any inferences.

In the interview, the students expressed that improving their collaborative argumentation in online writing had been prioritized over the complexity level of the language since Topic 3. In reality, they still made many revisions by using more advanced vocabulary. Such a trend could be linked to high school teachers' encouragement to use a more complex vocabulary, as mentioned by Heather, Carol, and Zena in the interviews.

4.2.3. Holistic-driven phase of collaborative argumentation

Toward the end of the semester, in Topics 5 and 6, students shifted to the holistic-driven phase of collaborative argumentation. In this phase, each group member was solely responsible for one aspect of revisions, and the argument was collaboratively constructed. This phase was therefore named the holistic-driven phase. Students focused on claim delineation, claim extraction, and reasoning extension. However, more diversified interaction practices occurred, such as language revision aimed more at enhancing the presentation of argumentation.

Such a shift in students' revision behavior was partially prompted by the instructor's suggestions regarding collaboration in online writing, such as the division of roles within a group. In this phase, the mutuality of revision has enhanced significantly, which was reflected in the increasing proportion of *elaborating* and *correcting*. The students also *deleted* the main ideas contributed by other students. For example, in Topic 5, Linda deleted the paragraph written by the previous writer that she deemed ineffective and yet failed to improve logical reasoning; whereas in previous phases, even the deletion of sentences was rare because students were afraid of disrespecting their group members' writings. In this phase, students showed more confidence in revising others' contributions with a view to co-constructing better arguments. In the interview, Linda observed that:

"We gradually understood the teacher's purposes (for giving us the guidelines). I think if we want to make progress, we should follow the teacher's instructions. Therefore, when I read the writings, I would consider whether this idea was relevant to the claim. If not, I would change it".

Students' attitudes toward collaborative argumentative writing also changed. The students wanted to revise the collaborative writing more comprehensively by the division of labor, rather than to focus on certain narrow aspects such as evidence use or word choice of language. As Zena mentioned, their revision behavior was not well-organized previously, and they solely centered on language use while neglected the content or logic of argumentation. In this phase, students engaged in more argument construction practices that required higher-order thinking, such as claim delineation and reasoning extension. Students also paid more attention to the coherence of argumentation than before. They also showed a heightened awareness of the cohesion of the whole writing, such as adding transitional sentences and cohesive devices. Such a shift could be accounted for by their growing audience awareness. As Zeno explained in the interview, when they reviewed other groups' writings, they would care about whether their argumentation was clearly and logically presented. Accordingly, as Linda mentioned, they would revise where the argumentation was not coherent or the logic was problematic from the readers' perspective.

Accordingly, language complexity was not the only focus during language revision. As shown in Fig. 4, their complexity index even decreased over the different versions, which has never been seen in previous topics. The language editor paid attention to the accuracy, conciseness, and coherence of language. The accurate word choice, correct grammar, and use of cohesive devices, as a result of effective revisions, all contributed to the effective presentation of their argumentation.

5. Discussion

5.1. Progression of collaborative argumentation

This study explored the progression of collaborative argumentation among English learners in a blended learning context. Overall, in both the face-to-face discussion stage and online writing stage, the structural and social aspects of collaborative argumentation and the role of language progressed over time. The progression of collaborative argumentation was reflected in the cognitive, social, and linguistic dimensions.

Cognitively, in face-to-face discussion, students' understanding of argumentation developed and improved, as reflected in their incorporation of argument construction practices that were more diversified and required higher-order thinking (Deane & Song, 2015; Lee, 2017; Osborne et al., 2004). The progression of collaborative argumentation during online writing was evidenced by their changed focus from discrete argument components to an integral argument (de Lima Tavares, Jiménez-Aleixandre, & Mortimer, 2010). Moreover, the collaborative argumentation in online writing was more sophisticated structurally than the oral argumentation during face-to-face discussion, which contradicts the previous studies that verbal arguments developed more in advance, and is more complicated, than written ones (Berland & McNeill, 2010). This might be due to the L2 context where the spoken ability of English learners is underdeveloped (Wang, 2014). This might also be accounted for by the dialogue-to-writing design of collaborative argumentation, in which collaborative dialogues prepared for, and fed into, collaborative writing (Jin et al., 2020). As Villamil and De Guerrero (1996) noted, English learners need social interactions to promote their cognitive activities in writing.

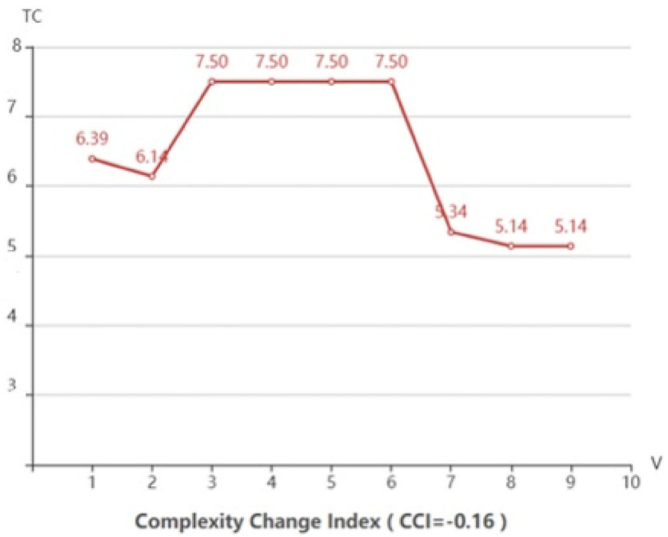

Fig. 4. Complexity change index in episode 5.

Socially, the progression of collaborative argumentation was reflected in how their argumentative interaction practices changed towards a greater collaborative tendency, with an increasingly higher degree of mutuality, which is believed to be important in improving the quality of collaborative writings (Li & Zhu, 2017). Students' engagement in argumentative discourse reflected their ability to reconcile different ideas, and their critical thinking, both of which are crucial to academic success in higher education (Andrews, 2015; Kuhn, 2020).

Linguistically, the progression of collaborative argumentation was reflected in the shifted role of English. In face-to-face discussion, students changed their attitudes from being fearful of using L2 to construct arguments to ignoring the influence of L2 on argumentation. This shift supports the advocacy of Lee et al. (2013) that offering students the contexts and opportunities for language use could help students feel at ease with using L2 in academic activities. Different from the receding attention to language use in argumentation during face-to-face discussion, the participants paid consistent attention to language use in argumentation during online writing throughout. From aiming at achieving a higher linguistic complexity index, to attempting to improving the presentation of written arguments, the role of L2 shifted from impediment of argumentation to facilitation of argumentation. Such a shift also reflected increased proficiency of the argumentative writing genre (Bychkovska & Lee, 2017; Leedham, 2015).

5.2. Influential factors of collaborative argumentation

The study identified various factors that might influence students' progression towards more sophisticated collaborative argumentation. For example, the learning environment has an impact on collaborative argumentation. As previous studies revealed (Kost, 2011), the affordances of online writing platforms allowed students to have more time, and to think deeper, in collaborative argumentation. The limited functions of the platform, however, also posed challenges for students. As Eaton suggested, it would be more helpful if they could chat on the platform.

It was also found that, consistent with previous research findings (Jin et al., 2020), different learning tasks prompted students to focus on different aspects of collaborative argumentation. This study found that, in face-to-face discussion, students focused on drawing out the skeleton of their argumentation; while in online collaborative writing, they paid more attention to accurate and effective language use, and enriching and explicating their argumentation. It should also be noted that teachers should give students enough time to finish the learning tasks. When the task is not given enough time, students might hurry to conclude (Veerman, 2003), which will negatively influence the quality of their collaborative argumentation.

The learning process, such as the interaction patterns among students, students' audience awareness, peer feedback, and teachers' instructions, and the language used might also have influenced the collaborative argumentation outcomes. Consistent with the findings of Short et al. (2020) that engaging with peer students' thinking was beneficial to scientific argumentation, the findings of this study suggests that students could propose a more inclusive argument when they engaged more in argumentative discourse by *challenging*, *elaborating*, or *revising* than when they merely proposed new ideas without carefully evaluating them. Another factor for consideration is students' increasing audience awareness, represented by the fact that they wanted the argumentation clearly presented to the readers by improving the coherence and the presentation formats of collaborative argumentation in online writing. Such audience awareness is valuable because it is one indicator that can differentiate expert writers from novice writers (Chang, 2015). Perelman (1971) also emphasized the importance of audience awareness in improving the validity of argumentation. Besides, peer feedback played a role. By learning to offer feedback based on the model of collaborative argumentation (given by the teacher), students started to understand the evaluation standards of argumentation and reflect on their own weaknesses and deficiencies. As Cho and MacArthur (2011) noted, offering feedback was beneficial for learning. Teachers' instruction in the learning process was also found to be influential A finding that corresponds with previous literature that the teacher should guide students to engage in argumentative practices, point out students' problems, and offer solutions (Veerman et al., 2002). The language used for collaborative argumentation might also influence collaborative argumentation. Too much emphasis on the accuracy of language use could hinder the production of a new idea (Lee & Tan, 2010). The findings suggest that too much focus on the complexity of L2 use at the beginning of the course impeded the students' collaborative argumentation, which was scaffolded by the use of L1 in group discussions.

5.3. Pedagogical implications

The findings suggest a few implications for future pedagogical design. The first suggestion is that teachers may tailor the instructional design according to the progression of students' collaborative argumentation (Berland & McNeill, 2010). For example, as students progressed in argumentative knowledge over time, the instructional framework could gradually move from the simplified CER model to the more complicated TAP model (Deane & Song, 2015; McNeill & Martin, 2011). Learning materials could gradually shift from the more straightforward ones that include simple arguments, to the more informational materials that involve complex arguments situated in authentic contexts (Novak & Treagust, 2018; Van Drie, Braaksma, & van Boxtel, 2015).

The second suggestion is to provide pedagogical support for active and collaborative interaction with argumentative discourse in face-to-face discussion. The findings of this study indicate that students did not actively participate in argumentative discourses that required critical thinking and shied away from exchanges that might cause conflicts. Teachers could encourage students to ask questions and engage with other's opinions (Chin & Osborne, 2010b), set specific goals, and provide

guiding questions regarding collaborative argumentation to promote the more active participation with argumentation (e.g., Ferretti, MacArthur, & Dowdy, 2000; Nussbaum, Kardash, & Graham, 2005).

Findings of this study also suggest teachers to direct students' attention to language use in general, away from specific linguistic aspects such as lexical use and syntactic structure (Pica, 2008). In this study, students' over-emphasis on linguistic issues might hinder the comprehensibility of their L2 use and the progression of collaborative argumentation. Teachers could, therefore, prepare rich argumentative learning materials to enable students to engage with language in information processing activities such as reading, argumentative inquiries, giving spoken presentations, and argumentative writing practices, to improve both language proficiency and argumentative competence (Lee et al., 2013).

6. Conclusions

The findings of the present study shed light on the process and development of collaborative argumentation in the English learning context of blended learning design from the structural and social aspect of argumentation, and the role of L2 in the collaborative argumentation activities. Results of this study can also contribute to the understanding of challenges students face at different stages of collaborative argumentation and possible influential factors of argumentation, as well as offer insights into the pedagogical design of teaching argumentation in a language learning context.

Despite the interesting results discussed above, some limitations exist. As with many case studies, this study's findings could only be regarded as provisional and explorative and could not be generalized into other contexts (Yin, 2018). Since various factors might also have an impact on the progression of collaborative argumentation, future studies could involve more participants with divergent educational backgrounds and different pedagogical designs to explore the progression of collaborative argumentation. This study only focused on the progression of collaborative argumentation, while the development of individual argumentative writings was not touched upon. In future studies, it would be interesting to look into the correlations between individual differences and the effectiveness of collaborative argumentation.

CRediT authorship contribution statement

Yanfang Su: Conceptualization, Methodology, Investigation, Writing - review & editing. **Kanglong Liu:** Methodology, Writing - review & editing. **Chun Lai:** Methodology, Writing - review & editing. **Tan Jin:** Conceptualization, Methodology, Writing - review & editing.

Acknowledgements

This research was supported by the Humanities and Social Science Foundation, Ministry of Education of China (17YJA740017) and the Fundamental Research Funds for the Central Universities (19wkzd18).

Appendix

Table S1
Coding Scheme for Argument Construction Practices.

Components	Practices	Description
Claim	Comprehension	Comprehension of the textual claim.
	Extraction	Proposition of one's own claim.
	Delineation	In-depth analysis of the reasons to support the claim, or adaptation of the claim based on new evidence.
Evidence	Description	General descriptions of appropriate evidence.
	Selection	Selection of relevant evidence from credible sources.
	Elaboration	Detailed descriptions of the evidence selected.
Reasoning	Identification	Identification of the direct links between evidence and claim.
	Analysis	Justification of why connections exist between evidence and claim.
	Extension	Valid inferences from the evidence to conclusions or implications.

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