Capturing (non-) collaboration in wiki-mediated collaborative writing activities: The need to examine discussion posts and editing acts in tandem

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Capturing (non-)collaboration in wiki-mediated collaborative writing activities: The need to examine discussion posts and edits to wiki texts in tandem

Most previous research exploring collaboration during wiki-mediated writing activities has focused on either students’ posts to wiki discussion forums or on their edits to wiki texts. This paper, however, argues that wikis are ‘convergent media’ which allow authors to work and make meaning across, as well as within, the two modes of interaction. In order to obtain a true picture of the nature of student-student (non-)collaboration in wiki-mediated writing activities, it is therefore necessary to examine students’ discussion posts and their edits to the wiki text in tandem. In response to this, a coding scheme and transcription format which aligns discussion posts with edits to the wiki text is introduced. The insights into student-student collaboration this approach affords are subsequently illustrated through a study which examines Kuwaiti high school students’ interactions during a wiki-mediated collaborative writing activity. The results of this study confirm that considering discussion posts and edits to the wiki text independently provides an incomplete picture of the nature of student-student (non-) collaboration in wiki-mediated writing activities. If discussion posts and editing acts are not considered in tandem, analyses may overlook a number of non-collaborative (e.g. refusing to accept one another’s edits and respond to feedback, and claims of ownership over the wiki text) as well as collaborative behaviors (e.g. willingness to accept edits and respond to feedback).

Keywords: wikis; collaborative writing; socio-cultural theory; collaboration.

# Introduction

Providing a platform, which permits groups of students to engage in collaborative writing, i.e. the co-authoring of texts (Storch, 2013), wikis have attracted significant interest from researchers in Computer-Assisted Language Learning (CALL). This interest in wiki-mediated collaborative writing is motivated by the sociocultural theory of second language acquisition (Lantolf, 2000; Lantolf & Appel, 1994) which posits that interaction, and in particular talking about language and language use, i.e. engaging in collaborative dialogue (Swain, 2000), is an essential process in second language learning through which students co-create knowledge about the target language.

CALL research has therefore sought to establish the extent to which students engage in collaboration during wiki-mediated writing tasks. Findings with respect to this question are mixed. While some studies have found that some students are willing to discuss and reflect on language use (Elola & Oskoz, 2011; Lee, 2010; Li & Zhu, 2011) and pool their linguistic resources to resolve uncertainties about the target language (Li, 2013; Nami & Marandi, 2013), others have observed a reluctance to engage in discussion with other students (Li & Zhu, 2011; Lim, So, & Tan, 2010; Lund & Smørdal, 2006).

One possible explanation for these conflicting findings is that, edits to wiki texts were not examined alongside related discussion forum posts. Wikis, it has been claimed, are “*convergent media”* (Herring, 2013), and in wiki-mediated collaborative writing activities authors might collaborate across the discussion forum and wiki text editor as well as within them (Li, 2013; Li & Kim, 2016). For example, using the discussion forum, a student might make a suggestion for an addition or edit to the wiki text, and the same or another student might follow this up by editing the wiki text accordingly. Alternatively, a student might make some changes to the wiki text and then notify his/her team mates of the change through a post to the discussion forum.

In this paper, a coding scheme and transcription format designed to capture the convergence of wiki discussions and writing behaviors is therefore introduced. The insights this approach provides into the nature of student-student collaboration during wiki-mediated writing activities are then illustrated through data from a study investigating Kuwaiti high school students’ engagement in such activities.

This paper in particular explores the following research questions:

* What are the limitations of considering discussion posts and edits to the wiki text separately?
* How can student-student collaboration in wiki-mediated writing activities best be captured?
* What additional insights does a coding scheme and transcription format designed to capture the convergence of discussion posts and editing acts provide into the nature of student-student collaboration in wiki-mediated collaborative writing activities?

# Wiki-mediated collaborative writing activities: A literature review

In order to understand the need for our proposed approach to the analysis of wiki interactions, it is first necessary to understand what a wiki is, what we mean when we use the term collaboration, and why opportunities for collaboration are important in language learning, as well as synthesize the findings of research exploring the extent to which students collaborate in wiki-mediated writing activities to date.

## Wikis

Developed by Leuf and Cunningham (2001), a wiki is a piece of software that allows any user or group of users, including those with little or no knowledge of web publishing, to create and edit a set of hyperlinked web pages (Mak & Coniam, 2008). Further to this, most wiki platforms also include a discussion forum through which users can make suggestions for corrections and additions to the web pages (Godwin-Jones, 2003). As such, wikis permit groups of users to engage in the co-construction of texts and collaborative dialogue around their construction, and a number of studies have explored the use of wiki platforms to support collaborative writing activities in the language classroom (Elola & Oskoz, 2011; Kessler, 2009; Lee, 2010; Li & Kim, 2016)

## Collaborative writing

Collaborative writing in its broadest sense is defined as the “co-authoring of a text by two or more writers” (Storch, 2013,p. 2). As such, collaborative writing might include approaches in which interaction among authors is limited to the planning and editing stages of the writing process and in which most of the writing is completed individually either by a single writer or by a team working on different sections in parallel. Others, however, make a distinction between collaboration and cooperation (Dillenbourg et al., 1996), and restrict the term collaborative writing to approaches in which there is significant interaction among authors throughout all stages of the writing process from planning through drafting to editing (Ede & Lunsford, 1990). Under this definition, approaches in which most of the writing is completed by a single individual, with feedback being sought only in the planning and editing stages are therefore not considered collaborative. The same applies to approaches in which members of a team work in parallel on different sections of a text in parallel. The latter is often referred to as cooperative writing (Storch, 2002).

Research on sociocultural theory suggests that interaction is an essential process in second language acquisition (Lantolf, 2000; Lantolf & Appel, 1994). Seminal work in this area includes Donato’s (1994) research on English learners of French solving English-to-French translation problems, and Swain and Lapkin’s (1998) analysis of the dialogue in which two French immersion students engaged while completing a written jigsaw task. In the former research, Donato observed that engaging in collective scaffolding enabled groups of students to solve translation problems which were beyond the proficiency level of all members of the group and use the target forms correctly in a follow-up task. Collective scaffolding, in this context, refers to progressively modifying and building on one another’s productions to arrive at the correct form(s) in the target language. Similarly, in the latter study, Swain and Lapkin (ibid.) found engaging in collaborative dialogue, enabled the pair of students to produce language which was beyond either student’s current level of proficiency, where collaborative dialogue refers discussions focused on language and language use also referred to as language related episodes (Swain & Lapkin, 1998) Ede and Lunsford’s (1990) more narrow definition of collaborative writing, that is the co-authoring of a text by two of more people working together throughout all stages of the writing process, is therefore adopted in this paper.

This paper argues that equality of contribution to the co-authored text and/or discussions about the text is necessary but not sufficient for writing to be considered collaborative. Engagement with one another’s contributions to the text and/or one another’s thoughts about the production of the text, is also essential for writing to be considered collaborative, as expressed in the concepts of “equality” and “mutuality” by Storch (2002, 2013).

## Research on collaboration in wiki-mediated collaborative writing activities

Much research has therefore focused on examining the nature of the interaction in which students engage during wiki-mediated writing activities. These studies have tended to focus on providing evidence of collaboration either within the edit mode (e.g. Aydin & Yildiz, 2014; Arnold et al., 2012; Kessler, 2009; Kessler & Bikowski, 2010; Mak & Coniam, 2008; Woo et al., 2011) or within the discussion forum (e.g. Lee, 2010; Arnold, Ducate, Lomicka, & Lord, 2009; Nami & Marandi, 2013; Li & Zhu, 2010), with few studies examining collaboration in both modes of interaction (Li, 2013, 2014; Li & Kim, 2016).

 Reviewing the research seeking evidence of collaboration in the edit mode, we find that while the level of contribution to the co-construction of the wiki text is unbalanced in some groups (Kessler & Bikowski, 2010), students are often willing to engage in peer editing (Aydin & Yildiz, 2014; Bradley, Lindstrom, & Rystedt, 2010; Kessler, 2009; Li, 2013). Peer editing, however, tends to be limited to adding, deleting, rephrasing, elaborating on and reorganizing each other’s ideas (Kessler & Bikowski, 2010; Li, 2013; Li & Kim, 2016; Mak & Coniam, 2008; Woo et al., 2011), with students paying little attention to form (Kessler, 2009; Mak & Coniam, 2008), expressing a reluctance to revise other students’ contributions and an unwillingness to accept other students’ revisions to their own work (Alyousef & Picard, 2011; Lee, 2010; Lund & Smørdal, 2006; Lund, 2008). In other words, while some studies focusing on the edit mode have observed equality of contribution to the wiki text, mutuality is often absent and rarely involves collective scaffolding of target language form(s).

In contrast, equality as well as mutuality is absent in the discussion mode in a number of studies (e.g. Grant, 2009; Judd et al., 2010; Lim et al., 2010; Lund & Smørdal, 2006). In these studies, learners rarely use the discussion pages to externalize their thoughts in relation to the co-construction of the text, i.e. to engage in language related episodes and collaborative dialogue. Yet in other studies students were observed to deliberate over their own and others’ language use, seek and give clarifications, feedback and suggestions to others, as well as collectively solve linguistic problems by scaffolding one another (Lee, 2010; Li, 2013, 2014; Nami & Marandi, 2013). That is, in some studies, mutuality, including collaborative dialogue, was observed in the discussion mode.

Just two studies have investigated interaction in both modes (Li, 2013; Li & Kim, 2016). In these two studies, interaction in the discussion forum was observed at a number of different levels, including socially, to provide technical support, to manage the task and to discuss language use as well as content. More specifically, students were observed to agree and disagree, elaborate on one another’s ideas, and elicit ideas from their fellow students, as well as question them. Similarly, students were observed to engage in a range of writing behaviors, including adding to, deleting, rephrasing, and reordering the content of the wiki text, as well as editing their own and other’s contributions to the wiki text (Li & Kim, 2016). In other words, mutuality as well as equality was observed in both the edit and discussion modes in both studies, including collective scaffolding in the edit mode and collaborative dialogue in the discussion forum.

In summary, the findings of research to date on wiki-mediated collaborative writing are mixed, with some studies observing mutuality as well as equality of participation in both the edit and discussion modes, and others observing an absence in particular of mutuality. It should, however, be noted that wikis are ‘convergent media’ (Herring, 2013), and there is the possibility that students may engage in collaboration, including collective scaffolding and collaborative dialogue, across the edit and discussion modes, as well as within them. Examining the modes separately, as has been common in previous research, may therefore not provide a true picture of the nature of student-student interaction in wiki-mediated writing activities.

In order to address this issue, in this paper, a coding scheme and transcription format is introduced which is designed to capture the convergence of discussions and writing behaviors. The insights into student-student collaboration, which this approach affords, are then illustrated through a case study focusing on Kuwaiti high school students of English as a Foreign Language (EFL).

# Collaboration in wiki-mediated collaborative writing activities: The case of Kuwaiti high school students of English

Collaborative writing activities form an important part of the high school English curriculum in Kuwait. While schools are well-equipped with information and communication technologies and the Ministry of Education promotes the use of technology across the curriculum, wikis are currently not regularly used to mediate collaborative writing activities in this context. Rather students’ use of technology within such activities tends to be limited to searching the internet for relevant sources at the pre-writing stage. Kuwaiti high schools therefore provide a useful context to explore how students with no previous experience of wikis might use them to co-author a text.

*Participants*

A convenience sample of three twelfth grade teachers of English as a Foreign Language (EFL) and their classes were recruited from two government funded girls’ schools in Kuwait. The students were intermediate learners of English. Their first language was Arabic, and their ages ranged from 17 to 18 years old. Within each class, in consultation with the class teacher, the researcher divided students into groups of four on the basis of their self-reported orientation to group work (see Appendix A). More specifically, groups were purposively constructed to include both more and less collaboratively oriented students to allow us to observe how teachers respond to a range of the different types of behaviors that students might exhibit during wiki-based collaborative writing activities. The analysis presented in this paper is based on one group from each class (see figure 1), namely the group in which students and teachers interacted most frequently with one another.

Figure 1 Sampling strategy

*The wiki platform and the activity*

The PBwiki platform (<https://my.pbworks.com>) was selected for use in this study due to its perceived usability. In PBwiki, unlike other wiki platforms such as MediaWiki (<https://www.mediawiki.org>) or Wikispaces (<https://www.wikispaces.com>), the discussion forum and wiki text can be viewed simultaneously (see Screenshot 1), facilitating the integration of feedback and suggestions made during the discussion into the wiki text.

Screenshot 1. PBwiki page

Collaborative writing, as said, forms an important part of the Kuwaiti EFL curriculum. Each unit of the prescribed grade 12 textbook ‘Over to You’ culminates in a collaborative writing activity. It can therefore be anticipated that Kuwaiti teachers might re-use these activities in a wiki environment. An activity selected from the students’ normal textbooks was therefore adapted for use in this study. This activity, presented in Appendix B, required students to design a poster about Kuwait.

### Data collection procedure

All classes were provided the same materials, which was conducted in spring 2014 and lasted for 13 weeks. During the first two weeks of the study, technical training in the use of the PBwiki platform was provided to students and teachers. During the next eight weeks, the students were asked to complete the aforementioned wiki-mediated collaborative writing activity. This activity was completed out-of-class. That is, depending on their access to a computer and the internet at home, the students completed the activity in their spare time either at home or in the school computer laboratory. During this time, the principal researcher signed up to receive, and followed, notifications of contributions to the discussions and texts. This helped the researcher to more fully appreciate how the discussions and texts unfolded over time.

### Coding scheme and transcription format

When analyzing the contributions to the discussion forum, the unit of analysis in this study was a post. When analyzing the contributions to the wiki text, the unit of analysis was an editing act. In order to capture interactions across the discussion and edit modes, the time stamps[[1]](#endnote-2) associated with each post to the discussion and edit to the wiki text were used to collate all the contributions into a single transcript. Replies to posts in the discussion forum were coded using an arrow (🡪). Editing acts were highlighted in grey, and deleted text was struck through, while added text was underlined. The role of the contributor was also coded as follows: teacher (T) or student (S; see Extract 1).

Extract 1 transcript of wiki interaction



Each contribution was then coded according to its function. Since discussion normally precedes writing and editing, posts to the discussion forum were coded first. At the highest level, three broad functions of discussion post were distinguished: organizational, socio-cognitive and socio-affective (Mangenot & Nissen, 2006). Organizational posts included those focusing on planning and managing the wiki activity; socio-cognitive posts included posts in which students discussed their own and other’s additions and edits to the wiki text; and, socio-affective posts included posts focusing on establishing and maintaining group cohesion. More specific functions were then identified using the coding schemes employed by Arnold et al., (2009; i.e. planning, contributing, seeking input, reflection/monitoring and social interaction) and Li (2013, 2014; i.e. content discussion, task management, social talk, technical communication and language negotiation).

Edits to the wiki text were first classified according to their functions drawing on the coding schemes employed by Li (2013; i.e. addition, deletion, rephrasing, reordering and correction), Li and Kim (2016; i.e. adding to, deleting, reordering and editing their own and other’s contribution to the text), Kessler and Bikowski (2010; i.e. adding information, clarifying/elaborating information and synthesizing information), and Mak and Coniam (2008; i.e. adding ideas, expanding ideas, reorganizing ideas and correcting errors). Then, in order to capture mutuality, the editing acts were further classified according to whether they focused on their own or another students’ text (Li, 2013; Li & Kim, 2016; see appendix C).

### Analysis

Before beginning the analysis, all names were replaced with pseudonyms. Having completed the initial coding (see above for details of the coding scheme employed), interactions were classified according to mode of interaction (discussion mode only, edit mode only, discussion and edit mode) and the transcriptions were examined for evidence of collaboration, i.e. mutuality and collective scaffolding (Donato, 1994) and collaborative dialogue (Swain, 2000).

Reliability of the coding was checked by asking a fellow applied linguistic to blind code 15% of the randomly selected extracts. The principal author and second coder agreed on the codes assigned to 86.7% of the posts.

# Results and discussion

Table 1 summarizes our results when focusing on the edit and discussion modes independently and then in tandem. As can be seen from the table, the interpretation of the data differs according to the focus of the analysis, wiki text only or discussion forum only, as well as whether the modes are considered independently or together.

Cases 1 and 2 illustrate the need to consider both modes. In both cases, students engage with one another’s edits to the wiki text, correcting each other’s wiki text as well as adding to and expanding on it. In other words, as in Li (2013) and Kessler and Bikowski (2010), students in both cases demonstrate mutuality in the wiki text and more specifically engage in collective scaffolding. In Case 1, however, while some students engage in collaborative dialogue within the discussion forum, seeking feedback from and providing feedback to one another as observed in Lee (2010), other students do not appreciate others editing their wiki text and claim ownership over their own text as observed in Grant (2009) and Lund (2008). Students in Case 2, on the other hand, demonstrate mutuality in the wiki text, but not in the discussion forum, collectively scaffolding one another’s contributions to the wiki text as seen in Bradley et al. (2010), but rarely posting to the discussion or engaging with one another’s posts.

The need to consider edits to the wiki text and posts to the discussion forum in tandem is illustrated by comparing Cases 1 and 3. In both cases, students engage with one another’s posts to the discussion forum as well as their edits to the wiki text, seeking and giving feedback in the discussion forum, as well as adding ideas to the wiki text and correcting one another in the wiki text. In other words, the students demonstrate mutuality in both modes, as observed in Li and Kim (2016) who examined discussion posts and edits to the wiki text independently. However, when the behaviors of students in Cases 1 and 3 are considered across the discussion and edit modes, it is observed that students in Case 1 do not incorporate one another’s suggestions into the wiki text, while students in Case 3 discuss potential contributions to the wiki before editing the text.

Table 1. Impact of focus of analysis (editing acts, posts to the discussion forum, or both) on interpretation

One reason for the differences in the results is that when focusing on one mode of interaction, researchers might miss contradictory behaviors in the other mode of interaction. Another reason for the differences is that wikis are convergent media and students may engage with one another across the two modes of interaction, responding to a post to the discussion forum by editing the wiki text or notifying other members of their group of edits they have made to the wiki text by posting to the discussion forum. The limitations of focusing on one mode and the affordances of examining the two modes in tandem are illustrated and discussed in more depth below.

***Limitations of focusing on edits to the wiki text only***

Two behaviors researchers might overlook when focusing on the wiki text only, and which might change the results, are rejection of peer editing (Extract 2) and claims of ownership of the wiki text (Extract 3). For example, in Extract 2, even though some of Salma’s edits to Aseel’s text resulted in corrections, Aseel rejected her edits.

Extract 2 Rejecting peer editing (Case 1)



Rejection of peer editing might relate to perceived ownership of unmodified contributions, as illustrated in Extract 3 from Case 1 below. Again, had we focused on the edit mode only when examining this extract, we would have concluded that the students were collaborating successfully because they corrected one another’s text.

Extract 3. Claiming individual ownership of the wiki text (Case 1)

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## Limitations of examining posts to the discussion forum only

Similarly, when focusing on posts to the discussion forum only, researchers might miss behaviors, which might alter their interpretation of the data. One example of such a behavior which might be missed is responding to feedback in the edit mode rather than through discussion. Another is failure to carry out revisions suggested during discussions.

*Responding to feedback in the edit mode*

An example of responding to feedback in the wiki text rather than through the discussion forum can be found in Extract 4 from Case 2. As illustrated in that extract, focusing solely on students’ posts to the discussion forum, it might be concluded that students did not collaborate because they did not respond to one another’s suggestions through follow up posts. Examining their editing acts, however, reveals that the students were using the two modes of interaction in a complementary manner, with Amy, Mei and Mohrah, incorporating Fai’s suggestion to write about international cuisines by expanding on and adding to Fai’s earlier contributions to the wiki text. That is, despite the lack of discussion, the students demonstrated mutuality.

Extract 4. Responding to suggestions using the wiki text editor (Case 2)



*Reluctance to revise wiki text in response to discussion*

On the other hand, focusing on posts to the discussion forum alone may lead to an overestimation of the level of student-student collaboration. Take, for example, Extract 5 from Case 1. When examining this extract, focusing on students’ posts to the discussion forum alone, might lead to the conclusion that they demonstrate mutuality because they are exchanging feedback on the content of their contributions to the wiki text. Examination of their editing acts in tandem with their posts to the discussion forum, however, shows that Aseel does not actually add a discussion of traditional Kuwaiti dress as suggested by Sarah and rather continues to discuss Eid, an Islamic festival celebrated in Kuwait. In other words, while mutuality is evident in the discussion forum, mutuality is absent from the editing acts.

Extract 5. Ignoring suggestions made in the discussion forum (Case 1)



***Affordances of examining posts to the discussion forum and edits to the wiki text in tandem***

Examining students’ posts to the discussion forum and edits to the wiki text in tandem also has affordances. In particular, it reveals that some students use the two modes in a complementary manner to engage in collaborative dialogue across them. They might respond to suggestions, feedback and discussions by editing the wiki text, notify their fellow students of changes they have made to the wiki text, or engage in more extended dialogues in which they move back and forth between the wiki text and the discussion.

*Responding to feedback and discussions in the edit mode*

As illustrated in Extract 4 from Case 2 presented earlier, students might respond to feedback provided in the discussion forum by editing the wiki. Further, discussions within the forum, might be followed up by edits to the wiki text once the students have resolved their linguistic problems (see Extract 6 from Case 3). In this extract, Samar, Eman, Laila and Sue discuss the verb ‘segregate’, its meaning and the grammatical form it should take, before Samar makes the appropriate change to the wiki text. In other words, the students in this extract not only demonstrate mutuality, but are also engaged in collaborative dialogue in which they are co-constructing knowledge about the target language.

Extract 6 Engaging in collaborative dialogue prior to editing the wiki text (Case 3)



*Notifying team mates of modifications to the wiki text*

 Another way in which students might engage in collaborative dialogue across the two modes is by first editing the wiki text and then notifying their team mates of and explaining their editing acts through posts to the discussion forum. This behaviour is illustrated in Extract 7 from Case 3 in which Samar responded to and edited what Sue and Laila had written. She followed up her editing with a post to the discussion forum, reviewing her team mates’ grammatical mistakes. Mutuality is therefore evident across the edit and discussion modes as well as within the edit mode in this extract.

Extract 7 Notifying team mates of edits to the wiki text through follow-up discussion posts (case 3)



*Extended collaborative dialogue*

The most collaboratively orientated students may go further and engage in extended episodes of collaborative dialogue in which they switch back and forth between the discussion forum and wiki text, responding to feedback by making edits to the wiki text and then notifying team mates of further changes that they have made to the wiki text through the discussion forum. An example of such an episode of extended collaborative dialogue is provided in Extract 8 Case 3, in which Sue seeks help revising her text on marriage. Laila obliges and expands on Sue’s ideas, and Samar notifies Sue that she has changed the voice of Sue’s contribution from the active to the passive. Accepting one another’s edits, sharing linguistic knowledge, and editing the wiki text accordingly, mutuality is evident within and across both modes of wiki interaction

Extract 8 Extended collaborative dialogue (Case 3)

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# Conclusion

In this paper, we explored the claim that wikis are convergent media and that it is necessary to examine discussions and writing behaviors in tandem to obtain a richer picture of the extent to which students can be considered to be engaged in collaboration, and collective scaffolding and collaborative dialogue more specifically.

 Our data from Kuwaiti high school students confirm that wikis are indeed convergent media (Herring, 2013) and used as such by students. Some students used discussion and edit modes complementarily to engage in collaborative dialogue and to respond to feedback in the edit mode rather than continuing the discussion in the forum, as well as to notify other group members about edits they had already made to the wiki text. Examining either discussions or writing behaviors in isolation, as was common to previous research, would therefore result in an under-estimation of the level of collaboration in which these students were engaged.

Examining either discussions or writing behaviors alone would, however, also have overestimated the level of collaboration of some groups at some points during the activities because some students used the discussion and edit modes in a divergent manner, with some students editing one another’s contributions in the edit mode while others rejected the edits and claimed ownership of the text in the discussion forum. That is to say, students may demonstrate mutuality in one mode, but not in the other, and the focus of the analysis, discussion contributions or writing behaviors, may have a significant impact on the interpretation of the data.

 In summary, our results confirm that it essential for researchers to examine contributions to the jointly constructed wiki text at the same time as contributions to the discussion forum in order to obtain a fuller picture of level of collaboration in which students engage. A number of limitations of the current study must, however, be acknowledged. First, the study was conducted out-of-class, with some students working at home and others in the computer laboratory during their spare time. Consequently, during the completion of the activity, the students may have consulted physical and online resources such as dictionaries and grammars, as well as peers and others, such as their parents and siblings. It was decided that students should complete the activity out-of-class to encourage them to exploit the affordances of the technology; during the pilot study students interacted with one another face to face rather than through the wiki and also looked at each other’s texts. In focusing solely on students’ editing behaviours and contributions to the online discussion forum, we, however, acknowledge that we may still not have a complete picture of the level of collaboration that students engaged in and may have missed other learning strategies. Second, the analysis was limited to one embedded case from each teacher’s classroom. Examining data from more embedded cases, and hence students, may have revealed different behaviors and consequently further limitations of examining the two modes of interaction independently, as well as affordances of examining them in tandem. Further, all the participants were female due to cultural and religious issues in Kuwaiti government schools. Both a sample of male students and a mixed sample may also have revealed different behaviors (Herring, 2000). For example, in a study examining the nature of males and females online messages, Herring (1996) found that male students dominated the online interaction and used an aggressive style whereas women tended to be aligned and supportive in orientation. Finally, since the focus was on the benefits of wikis for students’ linguistic development, and language is the primary mediator of knowledge construction, multimodal contributions to the jointly constructed wiki text including images, videos and hyperlinks were not examined. Multimedia are however widely used to communicate, make meaning and construct knowledge (see Kress, 2000), and some argue that it important to examine how meaning is made using multimedia in computer-mediated language learning activities (Hampel & Hauck, 2006). Students’ use of multimedia should therefore also be considered in future research.

Despite these limitations, our results show that wikis are convergent media and the examination of discussion contributions and writing behaviors in tandem reveals behaviors that would be overlooked if they were considered alone or separately. These behaviors include divergent as well as complementary use of the discussion and edit modes. Consequently, focusing on one mode alone may underestimate the level of student collaboration in some groups / at some points during an activity, and overestimate it in other groups / at other points, a finding which might explain some of the disagreement in the findings of previous research. Going forward, it is therefore essential that studies examining collaboration in wiki-mediated examine discussion contributions and writing behaviors in tandem. Re-examination of the results of previous research is also recommended where discussion contributions and writing behaviors are available and it is still possible to align them and examine them at the same time.

The implications for teachers are similar to those for researchers. Teachers either aiming to facilitate collaboration during wiki activities or assess the level of collaboration in which students engage must pay attention to their contributions to the discussion forum as well as their editing behaviors and consider them in tandem.

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1. A time stamp is a code which records the date and time at which an event occurred. Most wiki platforms attach time stamps to each contribution to the discussion forum and each editing act. [↑](#endnote-ref-2)