Investigating Writing Strategies and Revision Behavior in Collaborative Wiki Projects

CLAUDIA KOST
University of Alberta, Edmonton

ABSTRACT
This study investigated the use of wikis for collaborative writing projects. Fourth- and sixth-semester German students wrote several of the regularly assigned essay topics during one semester in collaboration with another student using a wiki. Participants used a variety of strategies in the planning, writing and revision phases of their essays. They also achieved a very high success rate in correcting the formal mistakes they detected by pooling their knowledge about language issues. The students enjoyed working collaboratively as they could share ideas and work with each other’s strengths, and they also liked the accessibility of the wiki. The wiki environment seems to benefit collaborative writing and promote successful revision behavior.

KEYWORDS
Wiki, Collaborative Writing, Writing Strategies, Revisions

INTRODUCTION
Collaboration
Pair and group work are supported by a social constructivist view of learning (Vygotsky, 1978) and have been firmly established in today's foreign language classrooms. Vygotsky posits that a novice's cognitive development arises in social interaction with a more capable peer (expert), by helping novices move from their actual level of development (i.e., what they can do by themselves) to their potential level of development (i.e., what they can do with assistance) which is also called scaffolding. Similarly, a more knowledgeable L2 learner can help out a less knowledgeable L2 learner when engaging in classroom tasks. Some studies (e.g., Donato, 1994; Storch, 2002; Swain & Lapkin, 1998) have shown that scaffolding can also occur among peers in pair and group work when they pool their knowledge about the foreign language to complete an assignment. Hence, activities that foster interaction and co-construction of knowledge to use the target language are essential for the language learning classroom.

Allowing L2 learners to complete a writing assignment together offers them the opportunity to interactively develop their writing skills, to use scaffolding to create a common, and probably improved, text, and to have a larger audience than just their instructor. Earlier studies in L1 collaborative writing reported benefits such as developing analytical and critical reading and writing skills (Nystrand & Brandt, 1989) and fostering reflective thinking (Higgins, Flower, & Petraglia, 1992). Previous research on collaborative writing in a foreign or second language has often focused on the final stage, the peer review, and has shown that students tend to focus on errors at the sentence and word level (e.g., Nelson & Carson, 1998; Villamil & de Guerrero, 1996). Collaborative writing has also found support in direct comparison to individual writings, when Storch’s (2005) research showed that collaborative
texts are shorter, but better in terms of task fulfillment, grammatical accuracy, and complexity.

For the last decade, the so-called “first-generation web tools” were used by many language teachers to increase their students’ opportunities to practice the target language in different skills and modalities, as well as for cultural learning. Email exchanges, discussion forums, MOOs or chats provided collaborative opportunities to enrich the regular classroom language lessons. Recent innovations in web design and their rising popularity particularly among the younger generation have started to attract the interest of language instructors (Lomicka & Lord, 2009). The so-called “second-generation” or “Web 2.0” tools such as blogs, wikis, podcasts and virtual environments seem to provide powerful, yet at this point still largely unexplored, opportunities for even greater collaboration among language learners. When discussing issues of collaboration, research usually distinguishes between cooperation and collaboration when talking about the completion of joint tasks: in a cooperative process, group members divide the work up, and each member completes his/her own part. At the end, the separate parts are assembled into a cohesive entity. In a collaborative approach, there is no task specialization and each group member works on all parts of the task, thereby accepting responsibility for the entire product (Dillenbourg, Baker, Blaye & O’Malley, 1996; Haythornthwaite, 2006).

**Wikis**

A wiki is generally defined as a “freely expandable collection of interlinked web pages, a hypertext system for storing and modifying information - a database, where each page is easily edited by any user with a forms-capable Web browser client” (Leuf & Cunningham, 2001, p. 14). A wiki allows its users to rapidly develop content in a participatory manner, as can be seen in Wikipedia, probably the best-known wiki. The downside of such open and democratic practices is, of course, that Wikipedia’s content is not validated formally and its accuracy may raise concerns (Hughes & Narayan, 2009). However, as a comparison study on scientific topics by Giles (2005) showed, the accuracy of scientific-related entries on Wikipedia was similar to entries in the *Encyclopedia Britannica*.

While wikis were initially utilized more in business settings (Chase, 2007), the application of wikis in educational settings, and especially in language learning, has grown in the last few years and has been researched in a number of recent studies. One line of research explored the development of students’ writing skills in secondary schools while completing common projects on wikis (Lund, 2008; Mak & Coniam, 2008). In both studies, students displayed good collaborative skills and enjoyed the sharing of ideas, but issues such as collective ownership and reluctance to correct each other’s mistakes occurred. The cultural learning in Lund’s study (EFL learners constructing collective perceptions of the United States) and writing for an audience in Mak and Coniam’s study (developing a school brochure for parents) contributed to the perceived success of these wiki projects. Other research studies analyzed students’ collaborative behaviors when they used wikis to create educational resources, such as a course content glossary (Hughes & Narayan, 2009), or a discussion forum and archive for pedagogical topics (Arnold, Ducate, Lomicka, & Lord, 2009).

A third research strand deals more specifically with participants’ revision behaviors while they collaborate on projects using a wiki. The various tasks include creating cultural background knowledge about a novel (Arnold, Ducate, & Kost, 2009), engaging students in wiki-based project learning (Evans, n.d.), collaboratively and autonomously defining the term “culture” (Kessler, 2009), supporting process writing for group collaboration and scaffolding (Lee, 2010), or developing advanced learners’ composition skills and comparing individual and collaborative writing (Elola & Oskoz, 2010). While all these studies pursued a
different purpose for using a wiki, they reported students’ abilities to focus on form and revise their writings successfully to varying degrees. In order to more fully understand how L2 learners utilize a wiki environment for composition purposes, other aspects of the writing process also need to be investigated.

METHODS
Previous research on writing instruction has often focused on editing and revising in the last stage of a writing assignment. When looking at writing as a process with different phases, it seems appropriate to also explore students’ approaches to other elements, such as planning, brainstorming, or adding or changing content. The goal of this study is to investigate the strategies that L2 learners employ when using a wiki as a collaborative writing tool as well as their revision behavior. The research was guided by the following questions:

1. What kinds of strategies do learners use when they engage in a collaborative writing process?
2. What kinds of revisions do learners make when they make changes to their common texts (i.e., changes for greater accuracy in grammar and vocabulary or stylistic changes)?
3. How do learners perceive the use of the wiki?

Participants
Students in fourth- and sixth-semester German language classes were offered the opportunity to write one or two of the regularly assigned essay topics during one semester in collaboration with another student using a wiki. Two participants (one female, one male) from a sixth-semester class as well as six participants (two female, four male) from two fourth-semester classes volunteered.

Procedure
Participants signed up as pairs and chose the essay assignment that they wanted to write collaboratively with their partner on a wiki. The researcher set up separate wikis for each pair and provided instructions on how to use the wiki. The wiki pages were hosted at pbwiki (now at http://pbworks.com). Students were aware that they would receive the same grade for the essay and that their instructor would not know which contribution each partner made. The instructors did not have access to the wiki and only collected the essay in paper copy. Students received no feedback on their writing prior to handing in the essay.

The sixth-semester class had just finished watching the movie Comedian Harmonists in class. Their essay topic was to tell the story of the Comedian Harmonists from the perspective of one of the main characters. They were asked to consider differing opinions among the characters and conflicts that arose from those opinions. The targeted length of the essay was about 400-450 words.

The fourth-semester classes worked with Der Auftrag, a radio play by Enzensberger and Eismann (Langenscheidt), throughout the semester. Several writing assignments with increasing length were based on the radio play. In one fourth-semester class, participants selected two topics that dealt with the story. The first topic was assigned after listening to only some chapters of the radio play, and students had to discuss how the two detectives, Gröger and Schlock, had come to know each other, where they had met and why they were now working together for their boss. The assignment focused on writing in the narrative past tense and the required length was 300-350 words. The second essay dealing with the radio play was assigned after the class had finished listening to it. Students had complained
that the ending of the story was rather unconvincing and boring, so the essay assignment was to write an alternative ending. They were required to write 400-450 words.

While the other fourth-semester class also wrote two essays, participants only chose one topic based on the radio play. This essay was assigned about midway through the radio play. Gröger and Schlock had followed the mysterious woman Zaza to Warsaw. Students were asked to re-tell what had happened on the detectives’ trip to Warsaw and on their way back to Berlin. They were asked to write from either Gröger’s or Schlock’s perspective, and the required length was 350-400 words. The second topic that was chosen by a pair of participants was a rather open topic based on some class discussion and geared towards practicing giving reasons and supporting their opinion. Students were asked to discuss which things in their lives they cannot imagine living without, such as their iPod or their laptop. They were to make a list of seven to ten things and explain why they are so important for them; required text length was 400-450 words. As the volunteering participants had to learn how to use a wiki and collaborate with a partner, which were both considered time-intensive aspects that the other students in the class did not have to deal with, the required length of the collaborative writing assignments was kept at the same number of words that an individual student in the class was asked to write.

**Data Collection and Analysis**

The four pairs of participants who signed up to write an essay with a partner chose to do one assignment collaboratively. In addition, after completing their first essay together, one pair from one of the fourth-semester classes decided to sign up for a second collaborative essay. This resulted in one sixth-semester essay (participants’ initials: E&M) and four fourth-semester essays (participants’ initials: B&B, R&Y I, R&Y II, H&D) available for analysis. Given that this research is designed as an exploratory study into writing and revision strategies with a small group of volunteers, no statistical comparisons will be made between the pairs.

Whenever a participant made a change on their wiki page, the change was registered by the wiki host and when the participant saved the changes, an updated version of the wiki page was created. All electronically archived versions of each wiki page were analyzed by the researcher. The wiki pages, as well as the other available tools (e.g., discussion function), were examined for strategies that participants might have used for the planning, writing and revision stages of the essay. The wiki’s archive function allows comparisons between any two versions and marks added text as underlined and deleted text as struck-through. Each version of an essay was coded according to a detailed taxonomy (Arnold et al., 2009). This taxonomy distinguishes between formal changes (surface changes), meaning-preserving changes (stylistic changes), and meaning-developing changes (adding and deleting content). In the present study, only formal changes and meaning-preserving changes were coded, as the research focus lies on the use of strategies and the specific linguistic revisions when writing an essay collaboratively and not on the amount of content that was added. Several categories from the taxonomy were not coded as they did not apply to the writing of an essay (e.g., “format” such as image, link, or headings; “factual corrections”; “reordering” did not occur). Table 1 shows the revision types coded in this study with examples from students’ wiki transcripts.
Table 1
Taxonomy of Revision Types for this Study (based on Arnold, Ducate & Kost, 2009)

<table>
<thead>
<tr>
<th>Formal Changes (Surface)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spelling</strong></td>
<td>kommisch → komisch (successful)</td>
</tr>
<tr>
<td><strong>Punctuation</strong></td>
<td>Schlock war sehr glücklich dass der Tag... → Schlock war sehr glücklich, dass der Tag... (successful)</td>
</tr>
</tbody>
</table>
| **Verbs**                | Nur, wenn wir sicher sein → Nur, wenn wir sicher sind (successful)  
Ich mochte Musik arrangieren... → Ich mochtete Musik arrangieren... (unsuccessful) |
| **Nominal/adjectival endings (cases, gender)** | er ist nicht ein gut Detektiv → er ist nicht ein guter Detektiv (successful)  
Jetzt ist meine Job bedeutend. → Jetzt ist meiner Job bedeutend. (unsuccessful) |
| **Word order**           | Der Zug nach Warschau jetzt fährt ab. → Jetzt fährt der Zug nach Warschau ab. (successful)  
Der Zirkusdirektor Rolf lief schreiend in den großen Schlafsaal. → Der Zirkusdirektor Rolf lief in den großen Schlafsaal schreiend. (unsuccessful) |
| **Lexical revisions**    | Tierführer → Tierpfleger (successful)  
Der Zug unterbleib... → Der Zug stellte ab... (unsuccessful) [the train stopped] |
| **Translation**          | How does he respond to Konflikten? → Wie hat er auf Konflikte reagiert? |

<table>
<thead>
<tr>
<th>Meaning-Preserving Changes (Stylistic)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Additions</strong></td>
<td>Alles machen ist zu schlafen. → Alles, was er macht, ist zu schlafen.</td>
</tr>
<tr>
<td><strong>Deletions</strong></td>
<td>Denn Zaza war früh und sie war schon im Zug. → Denn Zaza war früh und schon im Zug. [sie war deleted]</td>
</tr>
<tr>
<td><strong>Substitutions</strong></td>
<td>Ein Mann wer hat alle Schwarz geträgt... → Ein Mann, der völlig Schwarz gekleidet war...</td>
</tr>
</tbody>
</table>

At the end of the semester, a questionnaire was administered to explore participants’ perceptions of collaborative writing and using a wiki. The questionnaire included items concerning the user friendliness of the wiki, experiences about collaboration with their partner, and participants’ wishes for future collaborative assignments.

**RESULTS**

**Strategies**

The L2 learners in this study employed a variety of strategies when they composed their essays collaboratively. These strategies occurred mostly in three distinct phases and areas...
of the writing process, but there was also some overlapping of strategy use between the different areas: strategies during the pre-writing phase, strategies for adding or changing content, and strategies to make revisions.

In the pre-writing phase, all participants created an extra page on the wiki where they discussed how the wiki works. The mechanics of the wiki were quickly established and the pairs moved into figuring out their tasks. Two pairs engaged in extensive content brainstorming: E&M used MSN chat for two sessions, resulting in around 10 pages of conversation, to discuss how they would approach their topic. They came up with four questions to structure their narration and decided to tackle them individually before turning the responses into a cohesive entity at the end. H&D used a separate wiki page for the initial content brainstorming and also wrote messages back and forth for the entire time (6 days) that they wrote the essay. On the page where the actual essay writing happened, they established three columns with the following content: text in German, text in English to be able to check whether their German text expressed the meaning that they wanted to convey, and copied changes so that each partner knew what had been changed in the German text (without having to go to the wiki’s archive). They also added links to online dictionaries and grammar websites and uploaded useful handouts they had received in previous German classes to help them with grammatical features such as adjective endings.

In contrast to these extensive content brainstorming sessions done by E&M and H&D, the two other pairs worked very differently. B&B established a conversation page to set up the task, to figure out the wiki, and to quickly brainstorm. One participant outlined some of his ideas in a couple of sentences and then asked the partner to start writing. R&Y used a separate page in both essays to decide on a topic, but they did not brainstorm on the content at all; one of them just started writing.

Strategies for adding content and for making grammatical revisions could not be separated easily in the analyzed essays. However, as Table 2 indicates, some patterns emerge when the differences are examined quantitatively. Three pairs (E&M, R&Y I, and H&D) show a similar strategy of linking content changes and revisions. These pairs focused primarily on adding, changing, clarifying or reorganizing content during the writing phase, but they also engaged in smaller revisions in between. This might be due to the fact that these pairs also spent more time on writing their essays (6-11 days) and also produced a larger total number of versions (16-41). The difference between these pairs lies in the final correction phase: while E&M clearly focused their extensive revisions on the final version, R&Y’s essay I shows two extensive revisions in between, and H&D did not make any extensive final revisions at all.
Table 2

<table>
<thead>
<tr>
<th>Strategies for Content Changes and Revisions</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>----------------</td>
</tr>
<tr>
<td>Total number of versions</td>
</tr>
<tr>
<td>Number of versions with content changes</td>
</tr>
<tr>
<td>Other content-related strategies</td>
</tr>
<tr>
<td>Number of versions with revisions</td>
</tr>
<tr>
<td>Extensive revisions in any version</td>
</tr>
<tr>
<td>Some revisions in between</td>
</tr>
<tr>
<td>Other revision-related strategies</td>
</tr>
<tr>
<td>Duration of writing</td>
</tr>
</tbody>
</table>

B&B’s and R&Y’s II texts also display similarities: both essays consist of only five versions and were written during a very short time period (one night; two non-consecutive days). Interestingly, the five versions have an identical pattern: the first participant adds content in version 1; then the second participant engages in revisions in versions 2 and 3, and adds their own content part in version 4. The final version contains only one small content or formal change in either essay. The reason for the resemblance in configuration is, however, very different and will be explored further in the discussion section.

Some of the other content- or revision-related strategies that were used differed in location: while some participants (E&M and H&D) incorporated discussions about content or grammatical changes directly in their texts, B&B used their separate conversation page to keep each other updated. H&D and R&Y provided translations of their writing in their texts so that the respective partner could understand what they had written in German. The division of work between providing content and editing the language occurred only in R&Y’s
case; the other pairs either both added content and edited each other’s texts (E&M) or at least discussed changes on a separate page (B&B). H&D even stated: “Hi, XXX, I’ve made a few changes I think are correct (if you don’t know why or you disagree, let me know- I could very well be wrong). Also, please check my work as well”; thereby explicitly requesting that both participants check each other’s writing for grammar mistakes.

Revisions

Participants made a number of revisions to improve their essays in terms of linguistic accuracy and style. Table 3 presents a summary of the revisions made.

Table 3  
Summary of Wiki Page Revisions

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<tr>
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</thead>
<tbody>
<tr>
<td>Total words per essay</td>
<td>573</td>
<td>654</td>
<td>521</td>
<td>407</td>
<td>632</td>
</tr>
<tr>
<td>Total number of revisions</td>
<td>62</td>
<td>56</td>
<td>117</td>
<td>105</td>
<td>43</td>
</tr>
<tr>
<td>Number of total revisions per 100 words</td>
<td>10.82</td>
<td>8.56</td>
<td>22.46</td>
<td>25.79</td>
<td>6.80</td>
</tr>
<tr>
<td>Percent of successful revisions (formal changes only)</td>
<td>80.00%</td>
<td>89.79%</td>
<td>99.06%</td>
<td>96.84%</td>
<td>97.56%</td>
</tr>
</tbody>
</table>

Depending on the level of class (fourth and sixth semester) and the time of the semester, the required length of the essays varied as outlined in the procedures above, ranging from 300-350 to 400-450 words. R&Y’s second essay was within the required range of length (400-450 words), whereas all other analyzed essays were considerably longer: 35-94% longer than required. All pairs made a number of linguistic and stylistic revisions which ranged from 6.80 revisions per 100 words to 25.79 revisions per 100 words. The formal revisions were to a very large degree successful, ranging from 80-99.06%, meaning that the mistake that was addressed was successfully corrected by the revision.

When looking at the revisions in detail (Table 4), some differences in revision types become apparent. Formal changes were done much more frequently than meaning preserving (stylistic) changes (89% vs. 11%). Within the category of formal changes, three distinct areas in terms of amount of revisions can be detected: the largest number of changes was made in verb revisions (25%) and lexical revisions (24%), accounting for almost half of all formal edits. The second group, addressing less common revisions, consists of spelling revisions (18%), nominal/adjectival endings (18%) and word order (12%). The third and almost negligible group in terms of number of revisions includes punctuation (3%) and translation (1 instance).
Table 4
Wiki Page Revisions in Detail

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<tbody>
<tr>
<td>Formal Changes (Surface)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spelling</td>
<td>7</td>
<td>2</td>
<td>21</td>
<td>26</td>
<td>7</td>
<td>63</td>
</tr>
<tr>
<td>Punctuation</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Verbs</td>
<td>7 (3)</td>
<td>16 (3)</td>
<td>38 (1)</td>
<td>10</td>
<td>6</td>
<td>77 (7)</td>
</tr>
<tr>
<td>Nominal/adjectival endings (cases, gender)</td>
<td>8 (5)</td>
<td>7 (1)</td>
<td>10</td>
<td>22 (3)</td>
<td>4</td>
<td>51 (9)</td>
</tr>
<tr>
<td>Word order</td>
<td>3 (1)</td>
<td>5</td>
<td>14</td>
<td>11</td>
<td>5 (1)</td>
<td>38 (2)</td>
</tr>
<tr>
<td>Lexical revisions</td>
<td>12 (1)</td>
<td>12 (1)</td>
<td>20</td>
<td>23</td>
<td>14</td>
<td>81 (2)</td>
</tr>
<tr>
<td>Translation</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Total Changes</td>
<td>40 (10)</td>
<td>44 (5)</td>
<td>106 (1)</td>
<td>92 (3)</td>
<td>40 (1)</td>
<td>322 (20)</td>
</tr>
<tr>
<td>Meaning-Preserving Changes (Stylistic)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additions</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Deletions</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Substitutions</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>7</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>Total Changes</td>
<td>12</td>
<td>7</td>
<td>10</td>
<td>10</td>
<td>2</td>
<td>41</td>
</tr>
</tbody>
</table>

Note: Numbers in parenthesis indicate unsuccessful repairs.

Comparing the number and types of formal changes across groups, it seems that three of the pairs (E&M, B&B, and H&D) display a similar pattern in their editing behavior, whereas the pair R&Y made a substantially larger number of revisions in both of their essays. They made about twice as many total edits as the other three pairs. In regards to meaning-preserving changes, all groups made comparably few revisions.

Questionnaires

At the end of the semester, participants filled out a questionnaire about their experiences with the wiki and about writing an essay collaboratively with another student. Seven of the eight participants responded, resulting in an 88% response rate. On a 4-point Lickert item (3=yes, 2=mostly, 1=not so much, 0=no), participants rated the wiki as mostly user-friendly ($M=2.14$). Some of the problems that they encountered were that the wiki took time to set up initially and that it was not easy to distinguish between the original writing and the revised version. When asked whether they would like to have the option of writing essays collaboratively in other German classes, all participants (100%) responded with a resounding “yes”. Two participants (29%) would like to collaborate while sitting together at one computer without using a wiki, while five participants (71%) would like to use a wiki again.

Students also discussed their experiences about writing an essay with a partner. In general, using the wiki had a positive effect on scheduling and workload. Participants found it beneficial that they could work independently because there was no need to set up meeting times with their partners and that the wiki allowed them to write a bit at a time. Sharing the responsibility for the final product with another student had the effect that participants got started earlier and wrote faster because their partner’s grade depended on it. In terms of content, students noticed that “the amount of content seemed to grow faster” by working with someone else and that their partner’s perspective could help them with ideas. Students
also appreciated that they could correct each others’ mistakes and one participant noticed that “it was much easier to catch my partner’s errors than my own.” Another participant who might have felt unsure about his or her own language skills described one huge benefit as “having a partner to fix my grammar.”

For several of the perceived benefits, however, participants also commented on the other side of the coin. With regards to the previously mentioned benefit of having a partner fix one’s grammar mistakes, one participant observed in a less enthusiastic and more neutral tone: “This might not be a problem at all, but the work was pretty clearly divided between us. That is, my partner was the writer, and I was the grammar/spelling checker!” Similarly, while having a partner’s input on ideas was regarded as beneficial, different ideas also caused some problems concerning the direction an essay would take. The shared responsibility for the final product and grade also had a down-side as one student stated: “I still feel bad about some of the grammar changes that I made that affected my classmate for the worst.” Another issue that the participants had to work with was to accept another person’s style of writing which caused some of the writing “to go back and forth – it becomes a little rivalry” and that it took longer to work with a partner. Despite some problems that arose during the project, participants’ overall responses on the questionnaires were positive, and students seemed to enjoy the collaborative writing on the wiki.

**DISCUSSION**

*Research Question 1: What kinds of strategies do learners use when they engage in a collaborative writing process?*

In the pre-writing phase, most pairs engaged in some content brainstorming in the wiki or a chat room to decide which direction their essay should take. Another strategy that was employed was dividing the essay topic into separate guiding questions that could be answered individually. Both strategies resemble classroom activities that are often practiced before a writing assignment (Lee & VanPatten, 2003; Omaggio Hadley, 2001). L2 learners seem to adopt these practices and use them successfully to structure and outline their essay topics.

As far as strategies for content changes are concerned, several different types emerged during the analysis of the five essays. While some pairs limited their content brainstorming to the pre-writing phase, other participants had ongoing discussions while they were writing about further developing the content of their essay. Some of the discussions were done on extra pages, while other discussion strands were woven right into the essay text. Some pairs did not discuss the content at all, but instead just wrote separate parts of the essay or divided the work between providing content and making revisions.

One interesting observation could be made with regards to the two essays that R&Y wrote. While the first essay showed strong similarities to E&M’s and H&D’s strategies concerning content changes and revisions, R&Y’s second essay resembled B&B’s essay in terms of low number of versions, short period of writing, and identical pattern of adding content and making revisions. While these two essays were very similar in their structure, the reason for their resemblance was different: In B&B’s case, the participants procrastinated after the initial brainstorming and only got started with writing when one participant “threatened” the other one: “Alright, XXX, I love you to pieces, but if you don’t write anything in the next 24 hours, I’m writing and handing in my own essay.” The late start, of course, led to extreme time constraints so that the pair wrote the entire essay in the night before it was due. R&Y, on the other hand, benefited from their experience of already having written one essay together in which both participants had worked with the content, but only Y had made the revisions. In their second essay together, this established division between the work of the
“writer” and the “grammar checker” was openly reinforced by R who stated on the wiki-
internal discussion board: “Here is the first bit of our paper. I tried to write a little more
than my share since I need your help with editing, so hopefully that saves you time.” Both
essays showed that participants completed their task in a somewhat disjointed manner, just
connecting individual parts at the end to arrive at their final version. B&B’s essay and R&Y’s
second essay are mostly products of a cooperative approach, whereas the other three
essays display characteristics of a collaborative approach (Dillenbourg et al., 1996;
Haythornthwaite, 2006).

Revision-related strategies included ongoing discussions about grammatical issues in
various locations, sharing the responsibility of checking for linguistic accuracy among both
participants or having a designated “grammar checker” as discussed above, and the timing
of extensive editing. While three of the essays displayed that either both participants (E&M,
H&D) or only one partner (R&Y) made smaller revisions during the writing phase of the
assignment, only one pair (E&M) left the extensive editing to the last version of their essay.
These two students seemed to follow a more traditional and linear approach in their writing,
something like “write first, correct at the end”. H&D, in contrast, seemed to pursue a more
recursive tactic in that whenever they added content, they already made formal revisions
for any mistakes they detected in their existing text. This might also be the reason why they
did not do any final revisions. In Williams’ (2005) words, H&D employed a process approach
which “stresses the overlapping stages of writing, such as prewriting, drafting, revising, and
editing” (p. 77). Similar results in terms of employing a variety of strategies as well as using
them in overlapping areas and phases of the writing process were also observed in other
studies (Elola & Oskoz, 2010; Kessler & Bikowski, 2010).

Research Question 2: What kinds of revisions do learners make when they make
changes to their common texts (i.e., changes for greater accuracy in grammar and
vocabulary or stylistic changes)?

As the analysis has shown, formal changes regarding the accuracy of linguistic aspects of
the essays accounted for the largest percentage of revisions (89%). Without taking the
amount of content changes into account (which was not the focus of this study), this mirrors
findings in other studies investigating revision behavior such as Arnold et al. (2009), Hall
(1990), and Villamil and de Guerrero (1998). Focusing on formal changes vs. stylistic
changes seems to be an accomplishable task for learners at this level of proficiency. Of
these formal changes, mistakes in the categories verbs, lexis, spelling, and
nominal/adjectival endings were most often repaired. These types of revisions might point
towards the instructional focus at this level of proficiency where learners are expected to
detect and repair mistakes in these specific areas. All pairs displayed a very high success
rate in making formal revisions, ranging from 80-99%, which supports findings from other
studies that learners are able to identify and correct errors even if they have limited
proficiency (Ferris, 2006; Leki, Cumming, & Silva, 2008). This success rate is especially
encouraging considering the fact that the participants did not receive any feedback, but had
to find and diagnose all mistakes themselves.

The total number of revisions (range 43-117) as well as the number of revisions per 100
words (range 6.8-25.79) are considerably lower than the numbers described in a similar
wiki analysis focusing on learner’s revisions which reported a range of 15.49-87.39 revisions
per 100 words (Arnold et al., 2009). The results of the present study are more in line with
findings from New’s (1999) study which used word processing as the medium and showed a
range of 11.35-39.50 revisions per 100 words. Perhaps the specific purpose of the writing
task has an effect on learners’ revision behavior. Writing an essay on a wiki might be
perceived by the learners as more similar to writing an essay with regular word processing
tools (like in New’s study), hence resulting in a comparable quantitative revision behavior, than using a wiki to do a project or a longer informative report, such as in Arnold et al.’s study.

Another reason for the fewer revisions in the present study might be the time learners spent on the writing process. In Arnold et al.’s (2009) study, the projects were completed between three and six weeks, whereas in the present study, pairs took from 1-11 days for the actual writing of the essay. Clearly, with less time for the entire composition process, there is also less time for revisions.

When comparing the pairs of participants, another interesting observation regarding revisions can be made. The data show a similar picture across three of the groups, ranging from 43-62 total revisions and 6.8-10.82 revisions per 100 words. The fourth-semester pair R&Y, in comparison, made 105-117 total revisions and 22.46-25.79 revisions per 100 words in their two essays. This is about twice as many edits as the other three groups. The reason for this very high number of revisions was the low proficiency level of one of the students, R. He explicitly asked his partner Y to check his grammar because he was aware that he made many mistakes: “With my writing auf Deutsch please watch my word order and adjective endings. This is where I have the most trouble.” He also provided translations of his writing so that his partner could understand what he was trying to express. In the second essay that the pair wrote together, the division of work became even clearer when R wrote more than his share of content in exchange for Y’s help in editing his language. This clear division of roles between a writer and a grammar checker only occurred in this group and was also mentioned by both participants in their questionnaires. Oftentimes during a collaborative task, members of a group take over a specific role depending on their strengths or interests even without being assigned a formal role (Forsyth, 1999). In this case, R not only chose his own role as writer, but also assigned Y the role of grammar checker based on what he perceived as Y’s strengths. As Y had stated in the questionnaire, he was not sure whether this was a good idea, but he went along with it. The other pairs all participated rather equally in adding content and making revisions and did not display a clear division of work or assignment of roles.

**Research Question 3: How do learners perceive the use of the wiki?**

All participants perceived their essay writing experience with a partner as positive and useful, and spoke out in favor of more collaborative writing opportunities in other German classes. Benefits included the time-independent and shared workload as well as the pooling of available resources between the partners with regards to subject matter and linguistic knowledge. Problematic issues arose around specific roles that group members adopted or were assigned (but might not necessarily have wanted), finding an agreement between different writing styles, and sharing the responsibility for a partner’s grade.

Complaints about unequal contribution of group members that were reported in other studies on collaborative writing (e.g., Arnold et al., 2009; Winter & Neal, 1995) were not voiced in the present study. Most probably, this is due to the fact that participants wrote in pairs, making it more likely that both partners do their fair share. Students might also have used more effective communication skills to get their assignment done as is evident from the numerous entries on the wiki-internal discussion boards and extra conversation pages that all participants created in their wikis. These spaces were used during the entire process of writing to discuss ideas, ask grammatical questions, request help in editing or to encourage each other to get the work done. The positive and friendly atmosphere that prevailed in all teams also contributed to more equal distribution of workload and possibly to writing longer essays than required.
CONCLUSION
The present study investigated strategies as well as revision behaviors of L2 learners when they write an essay collaboratively in a wiki. As the analysis showed, participants used a variety of strategies in planning, writing and revising their essays that they had adopted either from classroom practices, that suited their learning styles, or that played to their individual strengths. Most pairs engaged in both content changes as well as formal revisions, and by working in pairs, they were able to discuss any language- or discourse-related questions that occurred and pool their knowledge to solve the issue. This supports findings from other studies in which students focused not only on grammatical accuracy and lexis, but also on discourse (Donato, 1994; Storch, 2002; Swain & Lapkin, 1998).

In the present study, like in other studies investigating revision processes (Arnold et al., 2009; Ferris, 2006; New 1999), participants were able to correct the majority of their formal mistakes successfully. They focused mostly on verb and lexical revisions as well as spelling and adjective endings. As these are common mistakes at the intermediate level of writing, it would be interesting to conduct further research at a higher level of language learning proficiency (3rd and 4th year composition courses) and explore whether students are able to address objectives that are characteristic of an advanced level of proficiency such as attention to reader, better cohesion, and use of more written discourse patterns instead of transferring oral discourse into writing when collaborating.

And while there was no direct comparison to individual writings conducted in the present study, most analyzed essays were much longer than required. This contradicts findings from Storch’s (2005) study, in which she found in a direct comparison between individual and collaborative writing that collaborative texts are shorter, but better in terms of task fulfillment, grammatical accuracy, and complexity. Future research should explore whether this discrepancy in length is due to the writing environment (wiki) or a specific task.

This research contributed further to our understanding of language learners’ collaborative writing strategies as well as their revision behavior, and it resulted in a number of positive findings. The wiki environment allowed students to work independently and gave them access to their partner’s initiated changes. Participants enjoyed working together and are in favor of more collaborative writing activities in other classes for which most of them would like to use wikis again. The variety of strategies that were employed and the successful revisions that were carried out by the participants underline the notion that a wiki provides a fruitful environment for collaborative writing projects.

NOTE
1 The students copied their MSN chat discussions into an extra page on the wiki so that the researcher had access to the discussions.

REFERENCES


**AUTHOR’S BIODATA**

Claudia Kost (Ph.D., University of Arizona) is an Associate Professor of German Applied Linguistics and German Language Program Coordinator at the University of Alberta. She teaches German language classes at all levels as well as undergraduate and graduate courses in applied linguistics, second language acquisition and teaching methods. In 2003, she was the recipient of the CALICO Award for Outstanding Graduate Student. Her research interests focus on computer-mediated communication, (including chat, wikis and blogs), teacher training and foreign language pedagogy. She has presented numerous papers at international conferences and has published on teacher training and CMC.

**AUTHOR’S ADDRESS**

Claudia Kost  
Department of Modern Languages & Cultural Studies  
200 Arts  
University of Alberta  
Edmonton, AB T6G 2E6  
Fax: 780-492-9106  
Email: ckost@ualberta.ca