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Use of Wikis in Second/Foreign Language Classes: A Literature Review

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Abstract
Wikis, as emerging Web 2.0 tools, have been increasingly implemented in language classrooms. To explore the current state of research and inform future studies, this article reviews the past research on the use of wikis in second/foreign language classes. Using Google Scholar and the ERIC database, the researcher examines twenty-one empirical studies published in fourteen peer-reviewed journals from 2008 to 2011. Specifically, the researcher takes a holistic review of this body of literature, including theoretical frameworks, research goals, contexts and participants, tasks and wiki applications, and research methods and instruments. The researcher identifies four main research themes investigated in the current body of literature: collaborative writing process, writing product, perceptions of wiki-based collaborative writing, and effects of tasks. Each of the four themes is sub-categorized into different research strands, and the synthesized findings regarding these strands are further discussed. In addition, the researcher indicates pedagogical implications, identifies the research gaps, and addresses potential research directions for wiki use in second/foreign language classes.

INTRODUCTION

A wiki was developed approximately in 1995 as a part of Web 2.0 - the read/write web. It is a piece of software that allows users to freely create and edit the content of web pages (Leuf & Cunningham, 2001). A wiki is 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). The term "wiki" is derived from the Hawaiian phrase, wiki-wiki, which means quick. Wikis are commonly regarded as collaborative mediums to promote content sharing and knowledge co-construction (O'Neill, 2005). As convenient communication and collaboration tools, various wiki applications (e.g., MediaWiki, PBwiki, Wikispaces) were rapidly adopted in enterprise in early 2000s and later widely used in education.

All wiki applications have three functioning tabs: "Edit", "History", and "Discuss". "Edit" allows the users to change or revise the page regarding the texts, images, or hyperlinks; "History" reflects the changes the page has gone through with the color coding of deleted and inserted texts; and "Discuss" enables the users to collaborate through messages about the page contents and revisions. Through features like user editability and detailed page history, wikis serve as powerful mediating artifacts for collaboration and support for collective production (Lund, 2008). As "architecture of participation" (O'Reilly, 2004), wikis enable participants to "collaboratively generate, mix, edit and synthesise subject-specific knowledge within a shared and openly accessible digital space" (Wheeler, Yeomans, & Wheeler, 2008, p. 989). The wiki has been used

as a source of information and as a tool for collaborative learning in the educational settings. Specifically, wikis enable students to share information and to engage in/scaffold each other's learning through student to student decision-making opportunities in group projects (e.g., Ducate, Anderson, & Moreno, 2011; Lee, 2010; Li & Zhu, 2011).

The popularity of wikis has begun to capture the attention of researchers and teachers in second/foreign language teaching, especially in second language writing. In the computer-mediated communication (CMC) contexts, writing is moving in the direction of "a more social construction of the activity and interactivity of writing" (Pennington, 2003, p. 304). Ware and Warschauer (2006) asserted, "asynchronous discussion formats, in particular, are believed to combine the interactive aspect of written conversations with the reflective nature of composing" (p.111). A wiki, as an asynchronous communication tool, supports many tenets of composition that are valued, including collaboration, continual revision, and communal knowledge formation (Purdy, 2009). The affordance of wikis eases the collaborative process, facilitates interactions, and develops student writing (Lundin, 2008). Being "intensively collaborative" (Godwin-Jones, 2003, p. 15), wikis have been widely used as popular platforms for collaborative writing in language classrooms.

Much research has discussed the potential of wikis in second/foreign language learning and instruction; however, there has been no comprehensive literature review on this topic. Therefore, this article aims to examine the current state of research on the use of wikis in second/foreign language classes so as to inform the future research and language teaching. The following research questions guided this study.

1) What theoretical underpinnings ground the current body of research? What research goals have been addressed? What wiki tasks have been included? What research methodologies have been applied? What research contexts have been investigated?
2) What research strands can be extracted, and what are the synthesized findings regarding these different strands?

METHOD

As this review focuses on using the wiki, an emerging instructional technology, in second/foreign language classes, six recognized journals which are particularly devoted to research and instructional practice in computer assisted language learning (CALL) were selected for review: *CALICO Journal*, *CALL-EJ*, *Computer Assisted Language Learning*, *Language Learning & Technology*, *ReCALL*, and *System (an international journal of educational technology and applied linguistics).* The researcher reviewed the articles published in the six CALL journals via key-word ("wiki"/"wikis") searching in the database of Google Scholar, and found sixteen articles addressing the use of wikis, including eleven empirical studies and five non-empirical studies.

Next, the researcher searched the publications from the ERIC database (Cambridge Scientific Abstracts), the most commonly used education database, which indexes additional peer-refereed journals publishing articles on the use of technologies in language classes. The researcher input

"Keywords=wikis or wiki AND Descriptors = second language learning" and identified eleven more articles addressing the use of wikis in second/foreign language classes, including ten empirical studies and one non-empirical study. Accordingly, the researcher found a total of twenty-one empirical studies and six non-empirical studies. The results of the distribution of empirical studies and non-empirical studies are displayed in Table 1 and Table 2, respectively.

Table 1
Distribution of empirical studies reviewed in this article

Journal Title	# of Articles	Empirical Study
CALICO Journal	3	Kost (2011); Lee (2010); Stickler & Hampel (2010)
Computer Assisted Language Learning	2	Kessler & Bikowski (2010); Li & Zhu (2011)
Language Learning & Technology	2	Elola & Oskoz (2010); Kessler (2009)
ReCALL	2	Bradley, Linstrom, & Rystedt (2010); Lund (2008)
System	2	Mak & Coniam (2008); Miyazoe & Anderson (2010)
Australasian Journal of Educational Technology	2	Alyousef & Picard (2011); Zorko (2009)
Computer-Supported Collaborative Learning	1	Lund & Rasmussen (2008)
Educational Technology & Society	1	Woo, Chu, Ho, & Li (2011)
English for Specific Purposes	1	Kuteeva (2011)
English Teaching: Practice and Critique	1	Lin & Yang (2011)
Foreign Language Annals	1	Ducate, Anderson, & Moreno (2011)
Interactive Learning Environments	1	Chao & Lo (2009)
International Journal on E-learning	1	Anzai (2009)
Journal of College Teaching and Learning	1	Wichadee (2010)

Table 2
Distribution of non-empirical studies

Journal Title	# of Articles	Study	Category *
CALICO Journal	3	Sykes, Oskoz, & Thorne (2008);	Conceptual discussions
		Thorne & Payne (2005);	Conceptual discussions
		Thorne & Reinhardt (2008)	Pedagogical model discussions
CALL-EJ	1	Zorko (2007)	Potential benefit discussions & Anecdotal accounts
International Review of Research in Open and Distance Learning	1	Zamorshchikova, Egorova, & Popova (2011)	Project descriptions/ Anecdotal accounts
Language Learning & Technology	1	Godwin-Jones (2003)	Potential benefit discussions

Note: * The categories of non-empirical studies were adapted from Wang and Vasquez (2012).

Since this review study is particularly interested in empirical research so as to provide the implications for future research on the use of wikis in second/foreign language classes, the researcher closely examined twenty-one empirical studies published in peer-refereed journals. However, this does not preclude the value of non-empirical studies, which provide theoretical insights and/or suggest pedagogical implications. For instance, Zorko (2007) shared her successful experience of using wikis as online collaborative environments in blended learning at a English for Specific Purposes (ESP) course. This article offered valuable insights for language practitioners in terms of pedagogy, content, design, and potential risks.

FINDINGS AND DISCUSSION

The twenty-one empirical articles in fourteen peer-referred journals were thoroughly reviewed in this article. The findings are presented in this section, with the illustrative tables, according to the two research questions mentioned above. First, the researcher provided a general picture of the empirical studies by providing a detailed matrix. Second, the researcher extracted the research strands explored in the current body of literature and synthesized the findings regarding the specific research lines.

Matrix of the Current Research

Using a holistic approach, the researcher examined the twenty-one research studies holistically, including the theoretical frameworks, research goals, contexts and participants, tasks and wiki applications, and research methods and instruments. The findings are presented in Table 3.

Table 3
Matrix of 21 empirical studies

Study	Theoretical /conceptual frameworks	Research goals	Contexts and Participants	Tasks & Wiki applications	Research methods & Instruments
Alyousef & Picard (2011)	Genre, metadiscourse	Students' perceptions of teamwork experience and use of the wiki as a collaborative tool	6 graduate students in an ESP course at an Australian university.	Four specific questions regarding an enquiry-based scenario, and a business report	Case study, using mixed methods, drawing on the data of the archives of wiki pages, instructor's feedbacks, and interviews
Anzai (2009)	Community of practice	Students' perceptions of their media consumption, e.g.,wikis and podcasts	160 Japanese EFL college students in Japan	N/A	Qualitative method using surveys
Bradley, Linstrom, & Rystedt (2010)	Sociocultural theory, Collaboration v.s. cooperation, Multiliteracy	Process of text co-construction	56 students in an ESP course at a Swedish university	Four EAP tasks on Wikispaces, concerning argumentation and critiques	Case study, drawing on qualitative data of archives of wiki pages
Chao & Lo (2009)	Sociocultural theory: scaffolding, Process writing, CMC	Perceptions of the use of wikis for writing skills and of their collaborative work	51 students in an EFL course at a university in Taiwan	One story script task on Wikispaces	Qualitative study using questionnaires
Ducate, Anderson, & Moreno (2011)	N/A	Students' perceptions of wiki-mediated collaborative work	30 students from three foreign language courses (French, Spanish, and German) at an American university	A digital micropedia of a French book, children's book in Spanish, and synthesis of historical and cultural terms from a German novel on Wikispaces	Qualitative study using questionnaires
Elola & Oskoz (2010)	Sociocultural theory, Community of practice, Collaborative dialogue	Students' approaches to wiki-based writing tasks, and the perceptions of the use of wikis for collaborative writing	8 students in a Spanish as FL course at an American university	Two argumentative essays on PB wiki	Mixed methods, using archives of wiki pages, questionnaires, and chatting logs

Kessler (2009)	Learner autonomy, CMC	Attention to form in the wiki-mediated collaborative writing tasks	40 students in an EFL course to pre-service teachers at a Mexican university	A class wiki creation, reflecting on what have been learned about culture	Mixed methods, using the archives of wiki pages and interviews
Kessler & Bikowski (2010)	Learner autonomy, CMC	Individual and group behavior, and students' demonstration of collaborative autonomous language learning	40 students in an EFL course to pre-service teachers at a Mexican university	A class wiki creation, reflecting on what have been learned about culture	Qualitative method using the data of wiki history pages and interviews
Kost (2011)	Social constructivism	Writing strategies and revision types	8 students from two German as FL courses at a Canadian university	One narration and one exposition on PBwiki	Qualitative study, using archives of wiki pages and questionnaires
Kuteeva (2011)	Social constructivism, Dialogism, Genre	Impact of using wikis on writer-reader relationship	14 students in an ESP course at a Swedish university	Paragraph writing and argumentative essay on Media Wiki	Case study, drawing on qualitative data, i.e. questionnaires, archives of wiki pages, and observation
Lee (2010)	Social constructivism: Scaffolding, Process writing	Students' perceptions of the use of wikis, and the influence of task types on collaborative writing	35 students in a Spanish as FL course at an American university	Four meaning focused tasks focusing on certain linguistic structures on Wikispaces	Case study, using archives of wiki pages, surveys, and interviews
Li & Zhu (2011)	Sociocultural theory: collective scaffolding, CMC	Patterns of group interaction and their influence on students' perceptions of learning experiences	9 EFL students at a Chinese university	Three tasks: narration, exposition, and argumentation on Wikispaces	Case study using qualitative data of archives of wiki pages, and interviews
Lin & Yang (2011)	Sociocultural theory, Process writing, Peer feedback	Perceptions of the effectiveness of wiki-based writing, and experiences of social interaction in the process of writing.	32 student in an EFL course at a university in Taiwan	One writing task pertaining to the textbook on Wetpaint	Qualitative study, drawing on the data of reflection logs, questionnaires, and interviews
Lund	Sociocultural	Activity types	31 students	One writing	Case study using

(2008)	theory: collective ZPD, sociogenesis, activity system	emerging from collaborative writing and students' perceptions	in an EFL course at a high school in Norway	task concerning culture titled " 'our' USA" on MediaWiki	qualitative method, drawing on archives of wiki pages, video recordings, and questionnaires
Lund & Rasmussen (2008)	Double stimulation	The role of relationship between task and wiki in collaborative knowledge construction	31 students in an EFL course at a high school in Norway	One task titled "How has the UK and/or the US influenced the English speaking world?" on XWiki	Qualitative study using video recording, field notes and interviews
Mak & Coniam (2008)	Authentic writing, Process writing	Students' interaction and engagement in collaborative writing	24 students in an ESL course at a secondary school in Hong Kong	School brochure to be distributed to parents	Mixed methods drawing on archives of wiki pages
Miyazoe & Anderson (2010)	Social constructivism: scaffolding	Students' perceptions of forums, blogs, and wikis, and learning progress students made through the use of the three tools.	61 students in three EFL courses at a Japanese university	A collaborative translation about a course content from English to Japanese.	Mixed methods using survey, interview, and archives of wiki pages
Stickler & Hampel (2010)	Constructivism	Students' perceptions of online tools (e.g,. wikis, blogs, flashmeeting, etc.)	2 focal students in a German as FL course at a British university	Jointly writing about learning German online	Case study drawing on questionnaires, and interviews
Wichadee (2010)	N/A	Effect of the use of wikis on writing skills, and students' perceptions	35 students in an EFL course at a Thai university	Five summary writing tasks	Quantitative study, using writing tests, questionnaires, and written reflections
Woo, Chu, Ho, & Li (2011)	Sociocultural theory, Computer-supported collaborative learning	Students' and teachers' perceptions about wikis' affordances, and students' revision process	38 students in an ESL course at a primary school in Hong Kong	Description of a certain animal with illustration of photos and graphics on PBwiki (PB works)	Case study using Mixed methods, drawing on questionnaires, interviews, focus-group discussions, and archives of wiki pages
Zorko	N/A	Students'	40 students	Minutes and	Case study using

(2009)	perceptions of interaction via wikis and the factors affecting wiki-mediated collaboration	in an ESP course at a Slovenian university	report writing on PBwiki (PBworks)	qualitative data of questionnaires and interviews

The studies presented in Table 3 will be further discussed from the perspectives of theoretical frameworks, contexts and participants, tasks and wiki applications, and research methods in this section. The research goals will be discussed later, in the section of "different research strands", concerning the research findings with regards to four main research themes, which have many overlaps with the research goals.

Theoretical frameworks

Most research was informed by sociocultural theory or social constructivism, including the constructs of Zone of Proximal Development (ZPD), scaffolding, activity system, community of practice, dialogism, and sociogenesis. Vygotsky (1978) proposed that learning occurred via social interaction in learners' ZPD, described as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). A wiki, due to its collaborative nature, has "the potential to advance and realize a collective ZPD" with its features and affordances socially enacted (Lund, 2008, p. 40). Scaffolding is another important construct to examine the process and dynamics of student interaction in the wiki environment. As Miyazoe and Anderson (2010) pointed out, "[…] collaborative learning fostered by scaffolding- provides a main support" (p. 185) for the use of wikis in education. Also, this body of research was informed by the construct of "community of practice" where learning is regarded as increasing participation; learners in the electronic community "do things together, negotiate new meanings, and learn from each other" (Wenger, 1998, p. 102). Moreover, Lund (2008) drew on the construct of sociogenesis to discuss the "learning as process *between* minds" (p. 40) in the wiki-based writing activity. In addition, Kuteeva (2011) revisited Bakhtin's dialogism (1986), reiterating that the dialogic nature of language use involves learner collaboration and dialogue, and analyzed the metadiscourse used in collaborative writing to explore the impact of wikis on reader-writer relationship.

Apart from sociocultural theory/socio-constructivism, some studies were informed by theories in second language acquisition (SLA) and second language writing (SLW), such as learner autonomy, process writing, and genre. For instance, Chao and Lo (2009), according to process writing, designed collaborative writing tasks at different stages of writing. Believing writing as a social interaction, Kuteeva (2011) drew on the genre knowledge and analyzed reader-oriented features and interactional metadiscourse resources of writings posted in wikis. Moreover, Kessler and Bikowski (2010), based on the theoretical construct of learner autonomy, developed a framework of collaborative learner autonomy in the technology-mediated learning contexts. They maintained that technology may promote more social opportunities for autonomous language practice and interaction.

Research Methods

Regarding the research methods, the majority of the research applied the case study approach, seeking to provide an in-depth understanding of using wikis in the second/foreign language classes. Qualitative data were predominant in most studies, drawing on multiple data sources. For instance, Li and Zhu (2011) set each small group interaction as a "bounded system" (Stake, 1995), and tracked the archived logs from wiki "Discussion", "Page", and "History" in each group to identify the patterns of computer-mediated interaction in wiki-mediated collaborative writing. Also, the researchers analyzed the data from semi-structured interviews to evaluate the influence of interactional patterns on students' perceived learning experiences. A few other studies adopted mixed methods, drawing on both qualitative and quantitative data. For example, Elola and Oskoz (2010) conducted a statistical analysis to compare the differences between the collaborative writing and individual writing in terms of fluency, accuracy, and complexity, and afterwards adopted a qualitative approach to examine the students' perceptions of potential benefits of using wikis for collaborative work. In addition, Wichadee (2010) adopted a quantitative method to compare students' English summary ability before and after instruction via wikis.

Worth noting, there were various instruments employed in this body of research, including archives of wiki pages, questionnaires, interviews, written reflections, observations, and video recording. To name a few, Lund (2008) examined the production of a wiki through the analyses of videotaped lessons, archived wiki pages, and questionnaires. Kuteeva (2011) also employed several research techniques to examine the impact of wikis on student writing, including participant observation, text analysis, and a self-report questionnaire.

Contexts and Participants

Previous research showed that wikis were used in second/foreign language classes in many parts of the world, i.e., Europe, America, Australia, and Asia. Among the twenty-one studies, six was conducted in Europe, six in North America or South America, eight in Asia, and one in Australia. Most of the languages involved were English as a foreign language (EFL) or English as a second language (ESL). The remaining research concerned other languages, including Spanish as a FL (Ducate et al., 2011; Elola & Oskoz, 2010; Lee, 2010), German as a FL (Ducate et al., 2011; Stickler & Hampel, 2010) and French as a FL (Ducate et al., 2011). Also, the majority of the studies were conducted at a university level. Three studies (Lund, 2008; Lund & Rasmussen, 2008; Mak & Coniam, 2008) were conducted in secondary educational settings, and only one study (Woo et al., 2011) in the primary school. Regarding the research at a university level, many of the studies were conducted in English for General Purposes (EGP) classes, and four of them were in ESP courses. This suggested that the use of wikis for ESP instruction is emerging, and the benefits of wikis is not solely related to language acquisition skills, but can also be linked with disciplinary knowledge construction. In these studies, student participants ranged from two to over one hundred. In many studies, students worked in small groups, which consisted of three to four members (e.g., Chao & Lo, 2009; Li & Zhu, 2011; Mak & Coniam, 2009). In a small number of studies, students worked in pairs (e.g., Elola & Oskoz, 2010), whereas a whole class of students collaborated in a class wiki writing in Kessler (2009) and Kessler and Bikowski (2010).

Tasks and Wiki applications

The task is also an important element which deserves examination, because the appropriate task promotes critical thinking and collaboration (Zorko, 2009), and the tasks may affect students' collaborative interactions (Lee, 2010). In the reviewed studies, some tasks concerned expository/argumentative essays (e.g., Elola & Oskoz, 2010; Kuteeva, 2011), some tasks concerned narrative type, such as story writing (Chao & Lo, 2009; Ducate et al., 2011), and others were involved with culture in the target language (Kessler, 2009; Lund, 2008). Part of the tasks specifically emphasized the appropriate use of certain grammatical points (e.g., Lee, 2010). Moreover, authentic task was particularly employed in Mak and Coniam (2009), and the task closely related to the students' discipline was also designed in Alyousef and Picard (2011).

Several different wiki applications were used in this body of literature. A total of thirteen studies mentioned the specific wiki applications. Among them, five studies used Wikispaces, four PBwiki, now called PBworks, two MediaWiki, one Wetpaint, and one XWiki. These applications share many similarities as well as some differences. An overview of different wiki applications can be accessed from WikiMatrix (http://www.wikimatrix.org/).

Different Research Strands

After examining the twenty-one empirical studies, the researcher found that the current body of literature predominantly concerned the use of wikis for collaborative writing. In line with the research goals presented in Table 3, four research themes were explored in the previous research: collaborative writing process, writing product, perceptions of wiki-based collaborative writing, and effects of tasks. Each of the four themes can be sub-categorized into different research strands, as displayed in Table 4.

Table 4
Specific research strands

Research strand		Studies	Number of studies
Writing Process	Phases of group behavior	Kessler & Bikowski (2010); Lund (2008)	2
	Individual revising behavior/types	Kessler & Bikowski (2010); Kost (2011); Mak & Coniam (2008); Woo et al. (2011)	4
	Focus on forms	Bradley et al. (2010); Elola & Oskoz (2010); Kessler (2009); Lee (2010), Woo et al. (2011)	5
	Patterns of interaction	Bradley et al. (2010); Li & Zhu (2011)	2
Writing Product	Writing quality/writing skill	Elola & Oskoz (2010); Mak & Coniam (2008); Miyazoe & Anderson (2010); Wichadee (2010)	4
	Genre analysis of texts: metadiscourse	Alyousef & Picard (2011); Kuteeva (2011)	2
Perceptions	Perceptions of benefits & challenges	Anzai (2009); Chao & Lo (2009); Ducate et al. (2011); Elola & Oskoz (2010); Kost (2011); Lee (2010); Li & Zhu (2011); Lin & Yang (2011); Lund (2008); Stickler & Hampel (2010); Woo et al. (2011); Zorko (2009)	12

	Perceptions of group work/interactions	Alyousef & Picard (2011); Chao & Lo (2009); Ducate et al. (2011); Li & Zhu (2011); Lin & Yang (2011); Zorko (2009)	6
Tasks	Effects of tasks on collaborative behaviors	Alyousef & Picard (2011); Lee (2010); Lund (2008); Lund & Rasmussen (2008); Mak & Coniam (2008)	5

As shown in Table 4, a total of nine research strands were identified in relation to four research themes. The majority of research investigated students' collaborative writing process in wikis and/or their perceptions of wiki-based collaborative writing. Some research examined students' writing products in wikis, and others further addressed the effects of tasks on students' collaborative behaviors. In the following section, the researcher synthesized the findings from the literature in regards to the nine research strands concerning four main research themes.

Collaborative Writing Process

The writing process was mostly examined through the analysis of text construction, such as phases of group collective behavior (e.g., Kessler & Bikowski, 2010), and individual revising behaviors (e.g., Kost, 2011; Mak & Coniam, 2008). Regarding the revising process, one research line addressed students' focus on form (e.g., Kessler, 2009). Moreover, a small proportion of research looked at patterns of interaction in small groups during collaborative writing process (e.g., Li & Zhu, 2011).

Phases of group behavior

There is one representative study (Kessler & Bikowski, 2010) which discussed the ways in which a whole class of students co-constructed a class wiki in a collaborative writing task. Kessler and Bikowski (2010) identified three main phases of group collaboration, i.e., build and destroy, full collaboration, and informal reflection. Students' unequal contribution was also detected: some had great contribution at all phases, while a few students behaved in a lurking manner. These observations enhanced our understanding of the nature of a large group's text co-construction and interaction.

Revising process/behaviors

Revising process is a research strand frequently delved into in the body of literature. Mak and Coniam (2008) identified four types of writing change functions that students were engaged in: adding ideas, expanding ideas, reorganizing ideas, and correcting errors when jointly creating a school brochure in the wiki environment. Kessler and Bikowski (2010) found similar individual revising behaviors when students collaboratively created a class wiki, such as adding information and clarifying/elaborating information. They also detected some instances of synthesizing information and adding web links in this study.

Woo et al. (2011) later extended Mak and Coniam (2008)'s taxonomy of writing change functions, and analyzed the revision types with respect to both content and forms, i.e., content revision, including adding new ideas, elaborating, reorganizing, and replacing existing ideas, and

form edits on grammar, spelling, punctuation, and formatting. These revision types echoed the findings in Kost (2011), which addressed such meaning changes as additions, deletions, and substitutions, and such form changes as edits on spelling, punctuation, verb, nominal and adjectival endings. This strand of research shed light on students' scaffolding process in both content and language points.

Focus on forms

It is generally acknowledged that attention to grammar and forms is important in language teaching. Lee (2010) reported that the Spanish as a FL students provided linguistic scaffolding for each other by correcting errors at both sentence and word levels in addition to engagement with the writing contents in collaborative writing tasks. Several more studies (e.g., Bradley et al., 2000; Elola & Oskoz, 2010) also found students' attention to both local language points and global contents. For instance, Elola and Oskoz (2010) reported that students collaboratively worked on different writing components: content, organization, grammar, editing, structure, and vocabulary. They not only jointly generated and refined the contents, but also focused on forms and revised the local aspects to achieve language accuracy.

However, different results were identified in other studies which revealed that students focused on meaning rather than forms during collaborative writing (e.g., Kessler, 2009; Woo et al., 2011). In Kessler (2009), students provided many content-based feedbacks, and overlooked grammatical errors which did not affect the understanding of the text meaning. The reason for the students' lower attention to errors revealed from the interview data, was that a wiki was regarded as an informal context as a writing platform. Woo et al. (2011) also found that the students were much more involved in content changes, and they believed that students' lower rate of form changes may be due to the PBworks technology feature of spell checks.

Patterns of interaction

A few studies looked at the patterns of small group interaction in the wiki-mediated collaborative writing with the understanding that interactional patterns impact students' learning/writing experience. Bradley et al. (2010), via qualitative analyses of the archived wiki "history" pages, identified three distinct patterns of interaction during the course of text co-construction. One pattern was a lack of visible interaction, evidenced by a full piece of text posted by only one individual; the pattern of cooperation occurred, evidenced by individuals working in a parallel fashion; the pattern of collaboration emerged when individuals engaged with each other's ideas and jointly wrote the essay. Different from Bradley et al. (2010), Li and Zhu (2011) focused on the ways of small groups' joint problem solving regarding writing, i.e., "ways in which students negotiated the writing tasks as well as ways in which students acted upon their negotiated meaning through text construction" (p. 7). They drew on the primary data from the wiki "discussion" tab as well as the secondary data tracked from wiki "page" and "history" tabs. Three distinct computer-mediated interactions emerged in this study: collectively contributing/mutually supportive, authoritative/responsive, and dominant/withdrawn. The first two patterns were found to positively influence students' perceptions of their learning experiences in the wiki-mediated collaborative writing. This research line added to the body of literature on patterns of interaction in second language learning, which were previously confined to the face-to-face contexts.

Writing Product

Another research area lies in the discussion of writing texts/quality/skills. This area fell into two main categories: the impact of wikis on writing quality and writing skills (e.g., Mak & Coniam, 2008; Wichadee, 2010), and the use of metadiscourse in wiki-based writing (e.g., Alyousef & Picard, 2011; Kuteeva, 2011).

Writing quality/writing skills

Writing quality/writing skills are significant aspects that reflect students' actual learning. Mak and Coniam (2008) addressed the positive impacts of wikis on students' writing product. They reported that students wrote more than what was required and that their sentences were more complex and creative than usual, due to the collaborative nature of the task and the audience. Moreover**,** Wichadee (2010) examined students' English summary writing ability after the wiki-based collaborative writing activities in an EFL course. Quantitative analysis of the writing scores suggested that students' summary writing skills significantly improved. However, not so encouragingly, Elola and Oskoz (2010) did not find the superiority of the collaborative writing product when comparing wiki-mediated collaborative writing and individual writing. They reported that the wiki-based collaborative writing had no statistically significant differences in fluency, accuracy, and complexity, compared with individual writing.

Genre analysis: metadiscourse

The other research line focused on the written texts, specifically students' writing texts from the perspective of genre. Kuteeva (2011) analyzed the interactional metadiscourse resources of student writings in light of the taxonomy developed by Hyland and Tse (2004). This study derived that writing in the wiki contributed to raising awareness of the audience and to increasing the use of interpersonal metadiscourse, such as engagement markers, hedges, self-mentioning, attitude marker, and booster.

Alyousef and Picard (2011) designed wiki-based writing tasks pertaining to the students' discipline in an ESP course. They analyzed student writing texts, including the discussion of five academic questions, and one business report, drawing on both Hyland and Tse's (2004) and Hyland's (2010) metadiscourse models. They compared the students' use of interpersonal metadiscourse features in the wiki discussion pages and in the report. Results showed that the students used most spoken-like interactional metadiscourse markers such as engagement markers and self-mentions in wiki discussion pages, while they highly employed hedges and attitude markers, the distinct features of academic writing, in the report. The researchers indicated that the use of wikis enhanced the students' awareness of audience and their grasp of academic genre. The above two studies suggested the great potential of using wikis as a learning tool in ESP courses.

Perceptions

Perception of wiki-based collaborative writing is the most examined topic area. This area includes perception of collaborative behaviors/interaction (e.g., Chao & Lo, 2009; Zorko, 2009), and perceptions of benefits and challenges of using wikis for collaborative writing and learning

(e.g., Lee, 2010; Lund, 2008).

Perceptions of collaborative behaviors/ interaction

There were no uniform results concerning students' perceptions of group interaction. Some students expressed positive attitude toward the peer review (e.g., Chao & Lo, 2009; Lin & Yang, 2011). For instance, in Chao & Lo (2009), students especially appreciated the mutual assistance in linguistic problems during peer editing. In other studies, however, students were not content with their group interaction, and equality of participation was their great concern. As Alyousef and Picard (2011) reported, rather than collaborative learning, students preferred cooperative learning in which students individually worked first, and later, the individual work was compiled to make a unified form (Donato, 2004). Also, in Ducate et al. (2011), part of the students stated that their group had managed to communicate and collaborate quite well, whereas other students complained about the insufficient communication in their groups.

Benefits of using wikis for collaboration and learning

Other research reported the perceived benefits of wikis. Students viewed many advantages of using wikis for collaborative learning. Most students perceived that wikis are fun and interesting tools to share knowledge (Chao & Lo, 2009; Ducate et al., 2011; Lee, 2010; Lund, 2008; Zorko, 2009), and also motivating for learning (Chao & Lo, 2009; Lee, 2010; Woo et al., 2011; Zorko, 2009). For instance, Lee (2010) found that wikis fostered students' motivation to be self-regulated due to the peer interaction and individual accountability in the wiki-based collaborative work. Also, students stated that collaborative writing and peer feedback in wikis helped them develop better essays in terms of content, structure, and grammar (Chao & Lo, 2009; Elola & Oskoz, 2010; Lee, 2010; Woo et al., 2011). Moreover, wiki-based collaborative writing enabled students to scaffold each other in content development, and gain more perspectives of a certain topic (Kost, 2011; Li & Zhu, 2011; Lund, 2008). For example, in Lund (2008), students particularly appreciated "the multi-voicedness and reciprocity of contributions as well as aggregated output" (p. 48) in the wiki environment. In addition, Zorko (2009), and Lin and Yang (2011) reported that students liked the immediate teacher feedbacks that the teachers provided via wikis, which greatly facilitated their collaborative work.

Challenges of using wikis for collaborative writing

Despite many benefits of wikis perceived in the body of literature, some studies (Ducate et al., 2011; Lin & Yang, 2011; Lund, 2008; Woo et al., 2011) revealed that students complained about the technical glitches of wikis. Lund (2008) reported formatting problems, i.e., the students could not save their edits in the selected font or color. These technical problems may discourage the use of the wiki as a collaborative platform. Part of the students were also concerned with unequal contribution among the participants (e.g., Alyousef & Picard, 2011). As Li and Zhu (2011) revealed, one student withdrawing from participation disrupted the collaborative learning experience of group members in the wiki-mediated collaborative writing. Moreover, some students preferred the combination of other synchronous CMC tools (e.g., Messenger) to communicate and co-construct knowledge, since the wiki, as an asynchronous tool, is not as convenient as the chatting applications to exchange instant messages (Lund, 2008). Accordingly, there are some affordances and constraints of wikis for collaborative learning. Lund and

Rasmussen (2008) reminded us that just the wiki by itself was "not enough to create the interactional accomplishment needed for collective production" (p. 406).

Task effects

Previous studies (e.g., Lee, 2010; Lund, 2008) have indicated the effect of tasks on collaborative behaviors in the wiki environment. Mak and Coniam (2008) stressed a social context for a real audience and an authentic piece of writing, and provided students an opportunity to create a school brochure for parents in a writing project. The results found that the students were actively engaged in this collaborative work due to authenticity of the task and their enhanced audience awareness. Lee (2010) also highlighted the importance of writing tasks, maintaining that topic/task choice affected the degree to which students engaged in collaborative writing. In Lee (2010), the authentic and engaging wiki topics allowed the students to be creative and also to attend to certain vocabulary and grammatical structures. They not only produced a great amount of writing, but also embedded multimedia sources to support the writing contents. This finding echoed Lund's (2008) observation that it is the task, not the technology itself, that may promote the high degree of collaborative exchange in the wiki environment. Lund and Rasmussen (2008) further discussed the complex relationship between tasks, wikis, and agents in the computer-supported collaborative learning environments. They called for the alignment of "task design with the development of technological features that boost agents' awareness of the different levels of collectivity that are involved in joint knowledge construction" (p. 410).

To confirm the effects of the task on interactional behaviors, Alyousef and Picard (2011) observed that more cooperative learning occurred where students divided/distributed the task between themselves than collaborative learning where the students did the task together. They argued that the nature of the task perhaps accounted for students' interactional ways, since "the students were rewarded on the number and quality of posts in the wiki, not how well they collaborated or worked together, the task itself seems to be cooperative rather than collaborative" (p. 475). Therefore, the design of the tasks is significant for the implementation of wikis for collaborative learning.

CONCLUSION

In this review of literature, the researcher examined the past empirical studies published in peer-refereed journals on using wikis in second/foreign language classes from 2008 to 2011. The findings indicate that wikis, as emerging Web 2.0 technologies, have been increasingly implemented for second/foreign language instruction at different educational levels, i.e., tertiary, secondary, and primary levels, throughout the world, including Europe, America, Asia, and Australia. The body of research is informed by a variety of theoretical perspectives, especially sociocultural theory. Case study approach drawing on qualitative data is mostly adopted to explore students' writing process and interactional behaviors, and their perceptions of using wikis for collaborative writing. The wiki writing tasks vary from the traditional classroom genre: narrative, exposition, and argumentation, to the authentic practical task and the task closely linked to academic discipline. Specifically, four main research themes were discussed, and the research findings regarding nine research strands were particularly synthesized.

The previous research offered valuable pedagogical implications for future application of wikis in language classes. First, the design of writing tasks is important. Well-designed tasks are conductive to collaborative interaction (Lee, 2010). Lee (2010) recommended open-ended topics which enable the students to be creative and also offer opportunities to reflect on language use. Mak and Coniam (2008) emphasized the writing instruction "with a purpose, in an authentic situation, through a writing process and with an outcome that is relevant and meaningful to student participants" (p. 439). Second, teacher's role is also significant. It is necessary to seek an "optimal role of a teacher in creating and maintaining autonomous learning environments" (Kessler, 2009, p. 92). Kessler (2009) called for more teacher involvement and grading incentive in the wiki autonomous learning environment. Teachers should not only initiate or administrate the wiki writing project, but also participate actively during the process of wiki-based collaborative writing, e.g., offering immediate and detailed feedbacks/comments regarding student writing, scaffolding and facilitating students' collaborative participation following task guidelines or grading rubrics, and even joining in their group discussion and problem solving. In addition, technology training is necessary for students to make better use of wiki features. Also, due to the individual accountability, assessment of both the process and the product of the collaborative work needs to be clarified.

Although increasing research has been conducted regarding the use of wikis in second/foreign language classes, further investigation needs to be done to fully explore the affordances of wikis for language learning and development. Research involving revisions via wikis "has just begun to scratch the surface" (Ducate et al., 2011, p. 515). Revision types were examined in several studies (Kessler & Bikowski, 2010; Kost, 2011; Mak & Coniam, 2008; Woo et al, 2011), but what has yet to be explicated are the ways in which students' joint revisions have influenced their collaborative writing product, and the ways in which wiki use has benefited the learning of specific linguistic items. These areas will definitely shed light on wikis' affordances for collaborative writing and language development. Also, previous literature has drawn attention to the writing process in terms of text construction (e.g., Bradley et al., 2010; Mak & Coniam, 2008). However, rather limited research (Li & Zhu, 2011) looked at small groups' overall interactional patterns emerging throughout multiple stages of writing. There is a need to further examine the dynamics of wiki-mediated interaction in small groups and the impacts of these interactional patterns on students' actual learning. Moreover, regarding interaction during wiki-mediated writing activity, research mostly addressed the interactions among students, while studies exploring the interaction between students and the teacher are rather scarce. This may result from the research designs where teachers did not participate in the wiki project; instead, they played the roles of observers or moderators. Further research study can introduce the teacher's active role in wiki-based writing activity, and explore how the teacher can scaffold students' learning in the wiki environment.

There is still a lack in the textual analyses of writing products that students co-construct in wikis (Kost, 2011; Kuteeva, 2011). A close examination into linguistic, rhetorical, and discourse features of students' essays posted in wikis will contribute more to the research body of both collaborative writing and genre analysis. Future study can further explore the use of wikis in ESP instruction, and scrutinize how exactly the wiki platform positively impacts students' acquisition of genre knowledge and academic writing. Also, qualitative studies account for a great percentage of the current body of research. Therefore, quantitative studies assessing the effect of wikis on second /foreign language learning are greatly encouraged. In addition, the present study

found that the majority of the studies have been conducted in university settings and in the EFL/ESL classrooms. The future research need further investigate how wikis are being used by various learning groups (i.e., learners of different languages) in the primary and secondary educational settings and in some other informal learning contexts.

Currently, research on combining wikis and other CMC tools in language instruction is emerging (e.g., Miyazoe & Anderson, 2010; Stickler & Hampel, 2010). The incorporation of multiple technological tools in language classes will provide a bigger picture on how these web 2.0 tools can potentially transform learning and pedagogy. With the development of emerging computer-based technologies for instruction and learning, wikis for collaborative learning will be increasingly implemented in second/foreign language classes. As Ducate et al. (2011) stressed, "We encourage educators […] to carefully consider the literature/research, most of which is just beginning to emerge, in order to make informed decisions when designing wiki tasks, when training students on how to use wikis, and when designing the intricacies of a particular wiki project" (p. 516).

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