

MORE THAN A LINGUISTIC REFERENCE: THE INFLUENCE OF CORPUS TECHNOLOGY ON L2 ACADEMIC WRITING

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This paper reports on a qualitative study that investigated the changes in students' writing process associated with corpus use over an extended period of time. The primary purpose of this study was to examine how corpus technology affects students' development of competence as second language (L2) writers. The research was mainly based on case studies with six L2 writers in an English for Academic Purposes writing course. The findings revealed that corpus use not only had an immediate effect by helping the students solve immediate writing/language problems, but also promoted their perceptions of lexicogrammar and language awareness. Once the corpus approach was introduced to the writing process, the students assumed more responsibility for their writing and became more independent writers, and their confidence in writing increased. This study identified a wide variety of individual experiences and learning contexts that were involved in deciding the levels of the students' willingness and success in using corpora. This paper also discusses the distinctive contributions of general corpora to English for Academic Purposes and the importance of lexical and grammatical aspects in L2 writing pedagogy.

INTRODUCTION

Recently, corpus technology has demonstrated great potential for second language (L2) writing instruction by integrating vocabulary, grammar, and discourse patterns of given types of writing into the teaching of L2 writing (Gledhill, 2000; Hyland, 2002; Jabbour, 1997, 2001; Tribble, 1999, 2002). A substantial number of corpus studies have been involved in developing corpus-informed syllabi, teaching materials, and classroom activities (e.g., Conrad, 1999; Flowerdew, 1998; Thurstun & Candlin, 1998). Those studies have emphasized that the corpus approach not only can enhance learners' awareness of lexicogrammatical patterning of texts, but also can foster inductive learning. Whereas early corpus research had an impact on the development of classroom materials and grammar references, researchers have begun to look at academic written discourse, in combination with genre analysis, to inform English for Academic Purposes (EAP) materials (J. Flowerdew, 2002) and "help students to develop competence as writers within specific academic domains" (Tribble, 2002, p.131).

While many corpus studies have mainly focused on genre-based text analysis and materials development, relatively few studies have examined students' writing experiences in association with corpus use. Moreover, those studies are limited in terms of their scope and data collection methods. The studies have addressed student reactions to a corpus-based lesson (Sun, 2000), the importance of training students in the corpus approach for their own use (Turnbull & Burston, 1998), and the effectiveness of independent corpus investigations (Kennedy & Miceli, 2001; Fan & Xu, 2002). Notably, most of the studies have focused on teaching a corpus approach *per se* rather than incorporating it into the writing process. In terms of data collection procedures, many of these studies conducted a one-time evaluation of students' use of corpora within a short time and provided limited qualitative insights (Fan & Xu, 2002; Sun, 2000), or else they studied a very small sample of participants with little use of corpora (Turnbull & Burston, 1998). In short, the previous studies did not fully illuminate students' corpus use in L2 writing, thus resulting in a limited understanding of the role of corpus use in student writing development.

Even fewer studies have examined the effect of the corpus approach on students' performance, which makes it difficult to assume the value of corpus-based pedagogy (L. Flowerdew, 2002). As Lee and Swales (2006) observed, there were only a few studies that examined students' attitudes toward corpora

or concordancing in EAP writing classes. Those are Yoon and Hirvela (2004), Gaskell and Cobb (2004), and Lee and Swales (2006).

Being aware of the scarcity of the studies in the area, Yoon and Hirvela (2004) examined ESL students' corpus behavior and their attitudes towards using corpora. Using quantitative and qualitative analysis, they found that corpus use helped the students learn common usage patterns of words, which resulted in increased confidence about L2 writing.

Gaskell & Cobb (2004) argued from their preliminary research that concordancing can also help lower-intermediate L2 learners with their grammar learning. They provided data-driven writing feedback to the students' typical errors by using the online concordancing software. The students were led to online concordance links from their drafts so as to correct their errors themselves. They found that although the results did not indicate a dramatic decrease in students' errors, many students believed concordancing was useful and concordance information could be a successful grammar resource.

In contrast to the two studies that used general corpora, Lee and Swales (2006) designed an experimental course for doctoral students who worked with both specialized and general corpora. As non-linguists-turned-corpus analysts, the students explored the lexico-grammatical and discourse patterns of their own disciplinary genres. The findings revealed that their knowledge about disciplinary writing increased through the "technology-enhanced rhetorical consciousness-raising" activity (p. 72).

The above-mentioned studies can be seen as an answer to the widespread criticism that "the various educational uses of concordancing are more talked about than tested with real learners" (Gaskell and Cobb, 2004, p. 317). The studies have increased our understanding of corpus use in L2 writing, but they do not provide an extensive treatment of the role of the corpus approach in L2 writing pedagogy. There is a need for further research that explores how the use of corpus technology affects students' L2 writing behavior and process. As Phinney (1996) points out, technology may not automatically generate better written products, but it may change "the way writers approach the writing process" (p.139). Much needs to be done to find out how the use of corpora affects students' L2 writing experiences as a whole. Yoon and Hirvela (2004) collected student feedback on their perceptions of corpora through semi-structured interviews, but it was limited to one-time short interviews. We still need more qualitative insights to determine the potential of concordance work in students' writing development over a longer period of time.

In addition, little research has looked at the students' individual experiences in the analysis of corpus use. In fact, many corpus studies have regarded learners as a monolithic group rather than as idiosyncratic individuals. Some research found differences in the effect of corpus use on language learning related to personal backgrounds, such as language proficiency and familiarity with the new approach (Turnbull & Burston, 1998; Yoon & Hirvela, 2004). Given the individual and private process of writing, we need to develop learner-specific descriptions of corpus use in order to adjust our instruction to learners' needs.

Another important issue in the use of corpora in L2 writing pedagogy is the selection of corpora. Many previous corpus studies used in-house programs or specialized corpora as opposed to general corpora. It is true that many scholars have emphasized the usefulness of specialized corpora in EAP. However, general corpora can also have a place in L2 writing classrooms. Many teachers may not have the time or skill to develop their own corpora. Fortunately, some general corpora allow free access so that teachers do not need to construct their own corpora. More importantly, general corpora can make distinctive contributions to EAP writing programs. Considering that students are often from a variety of disciplines, it may be impractical to focus on one discipline-specific corpus in writing courses. General corpora can be used more effectively by focusing on the most frequent general words, thus catering to the needs of all the students in the program. Bernardini (2001), one of the proponents of using general corpora in language teaching, argues that easily accessible online corpora (e.g., the Bank of English) opened a new era for "wide-ranging exploration of the pedagogic potential of large corpora" (p.220), which can promote

"serendipitous learning" (p. 226.) We need an empirical report from actual teaching that uses easily accessible general corpora to encourage teachers and students to use the new corpus approach.

This study attempts to fill several gaps in the research literature by examining the writing process associated with corpus use over time, investigating how corpus use affects the way students deal with linguistic issues in writing and the ways they approach L2 writing. Additionally, the study considers a variety of students' individual experiences and learning contexts so as to deepen our understanding of corpus use in ESL tertiary classrooms. The research questions addressed were as follows:

How do ESL students use corpus technology in L2 academic writing?

How does corpus technology affect their language learning and approaches to L2 writing?

What are individual experiences and contextual factors that mediate the influence of corpus technology on students' L2 writing?

METHODS

Setting

The research site of the study was a graduate-level advanced ESL academic writing course at a large American research university. This university requires non-native English speakers to take an ESL writing placement test upon their arrival. The results are used to assign students to one of three courses in the undergraduate or graduate sequences in the program. The final course in the graduate sequence was chosen for this study. The course was taught by a veteran ESL teacher who had used corpus work extensively in his own teaching. A preliminary study was conducted with the same instructor one year prior to the present study in order to develop research skills and enhance the design for the present study. Prior contact in the earlier study (Yoon & Hirvela, 2004) established significant rapport between the instructor and the researcher.

The class met twice per week for two and a half hours per session for ten weeks. The course was an ideal choice for the purpose of this study in that the teacher incorporated the corpus approach into the curriculum as part of the regular classroom activities, rather than focusing on teaching the approach *per se*. The research site can be seen as an EAP writing course, rather than a general ESL course, given its content and emphasis on disciplinary writing. The course not only taught the students about the general structure of academic papers, but also required them to follow the writing conventions of their own fields. As such, students chose the topic and content of their writing based on their interests and needs in their studies.

The classroom teacher in this study used a free online corpus, the Collins COBUILD Corpus, which is one of the largest general corpora available. As general corpora are often used to represent common usage of the language, the issue of representativeness becomes more important for general corpora than for specialized corpora because "corpus results always depend to a large extent on size and composition of the corpus" (Kaltenböck & Mehlmauer-Larcher, 2005, p.76). The Collins Cobuild corpus was considered a good choice for the study because of its accessibility and size. The corpus, also known as the Bank of English, consists of more than 500 million words as of January 2007 and continues to expand in size based on carefully designed sampling methodology. The Collins COBUILD website [<http://www.collins.co.uk/Corpus/CorpusSearch.aspx>] provides a concordance and a collocation sampler from which one can draw 40 randomly chosen concordance lines and see what are statistically the most frequent 100 collocates. The sampler offers instructions on how to conduct a search, though the concordance and collocate search process requires minimal technical skill. Also, the corpus is word-class tagged so that one can narrow a search by using the part-of-speech tags (e.g., search "use/NOUN").

The teacher wanted students to integrate corpus use into their writing to become more independent and advanced writers.¹ He required students to search the corpus regarding their own writing problems and to e-mail the search results to him on a weekly basis. He then combined those results on handouts regularly provided to the class so students could benefit from each other's corpus searches. In addition, he usually began class sessions by commenting on writing errors that he found in students' drafts. He encouraged them to research the problems through the corpus. He also wrote feedback on their papers, directing them to search out solutions rather than correcting errors immediately. In so doing, he expected that by the end of the course, the class would generate a useful lexicon that stemmed from their own errors. Worth noting here is the instructor's pedagogical model for the design of the course. Students were expected to use corpora to solve their sentence-level writing problems by themselves, while the teacher used other materials (e.g., Swales & Feak's, 1994, *Academic writing for graduate students*) and activities (e.g., constructing a style manual for academic papers in a given field) to teach the organizational and rhetorical aspects of academic writing.

Data Collection and Analysis

As this study adopted a primarily qualitative framework in order to closely examine the students' L2 writing process over an extended period of time, it focused on six case study participants among the 14 students in the class. Regarding nationality, the class was not very diverse; ten students were Korean, three were Chinese, and one was Romanian. At the beginning of the course, six students were chosen to reflect diversity in age, gender, academic major, writing experiences, and technology skills, and they became the main focus of the research. The study followed up on the six focal students in the subsequent quarter in order to examine their independent corpus use and L2 writing after they left the writing course. In this respect, this study can be seen as a response to Chambers' (2007) call for research on students' autonomous corpus use apart from classroom-based use. Reviewing earlier studies in learner corpus consultation, Chambers also called for further report from non-corpus expert teachers (rather than from researcher-teachers), which was also implemented in the present study.

This study used triangulation of multiple methods and data sources as a way of ensuring credibility of the data as well as obtaining thick contextualized descriptions about the topic. The data came from six main sources: 1) classroom observational notes, 2) interviews, 3) recall protocols, 4) corpus search logs, 5) class corpus search assignments, and 6) written reflections on corpus use. During classroom observations over the ten weeks of the quarter, observational notes were kept in a researcher journal. The participants were interviewed approximately once every two weeks for an hour during the first quarter. However, due to a corpus service breakdown that occurred several times during the following quarter, comparatively fewer interviews were conducted in the second quarter. The unexpected technological breakdown made the interviews address hypothetical questions rather than real-world experiences. Questions were restructured to ask students how they would have used the corpus had it been available at that time. All interviews were recorded on audiotape and transcribed as soon as possible in a standard word-processing program for subsequent analysis. As is common in qualitative research, analysis of the data components was done simultaneously with data collection so that the study was shaped to focus on issues emerging as data were collected.

Participant Background

This study constructed portraits of the six focal students consisting of individual life experiences and writing experiences. Those experiences were a lens through which to understand different contexts of the individual students' L2 writing experiences. [Table 1](#) provides an overview of those experiences which were considered likely to be most relevant to this study.

Table 1. Overview of Case Study Participants

	Wol² (28, F)	Chan (29, M)	June (24, F)	Sung (32, M)	Nick (29, M)	Ming (29, M)
L1	Korean	Korean	Korean	Korean	Romanian	Chinese
Program of study	M.Ed., Special Education	Ph.D., Natural Resources Education	M.S., Aerospace Engineering	Ph.D., History	M.S., Nuclear Engineering	Ph.D., Molecular Genetics
Years of English learning ³	12	13	13	14	5	10+
Months in U.S. at the start of the study	12	1	1	1	12	1
TOEFL (TWE) scores ⁴	240 (4.0)	270 (4.5)	240 (3.5)	253 (4.0)	217 (3.5)	607 (3.5)
Unique experiences affecting English/literacy skills	Korean language teacher (3 ½ years)	Military service at US Army base MED qualitative research thesis		MA in Japan	Took previous writing classes in the ESL program	Published a paper in English
L2 writing experience	TWE	TWE & Took a class in Korea	TWE	TWE	1 yr coursework in US & previous writing classes	TWE & Published a paper in English
Computer skills	Low	Intermediate	High	Low	High	High

Four students were majoring in science-related fields (one in combined science and education); one was in education; and the other one in the humanities. Two participants, Wol and Nick, had been in the United States for one year; the other four students were new arrivals, and they were still adjusting to the new environment as foreigners. All except Nick were experiencing their first academic term in an American university setting. Wol had been in the United States for the previous year as a housewife, but this was her first American academic term.

The students were assumed to be at similar, if not the same, levels of writing proficiency because they were assigned to the course based on placement test results or after completing the prerequisite courses. Nick was the only one who was not directly assigned to the course by the test. He had spent one year in the institution where he took the first two courses of the three course-sequenced writing program. During that time, Nick also performed many writing assignments in classes and learned L2 writing. [Table 2](#) presents a more specific description of the focal students' views of L2 learning and their writing processes, which were obtained from the initial interviews with them.

Wol enjoyed writing in her native language, as she used to be a Korean language arts teacher. She did not have any academic writing experiences in English. She neither had much content knowledge nor disciplinary writing experience in her field of study, since the major was a new field to her. Nevertheless, she was confident in her L2 writing, as she believed she could always generate many ideas with ease. At the same time, she wanted to develop her own writing style. She even hoped to keep her unique L1 voice in L2 writing.

Like Wol, Chan enjoyed writing in general, and among the participants he had the most experience in L1 academic literacy. He wrote a qualitative research thesis in partial fulfillment of the requirements for his master's degree in Korea. Moreover, pursuing the same major throughout his college and graduate studies provided him with a large amount of content knowledge in his field. He was not afraid of L2 writing, and he believed any type of writing activity was manageable. Most of all, he had a sincere, genuine interest in

L2 writing. Thus, his goal in writing was not just to communicate ideas, but to develop persuasive and powerful texts.

Table 2. Overview of Participants' Views on Language Learning and Writing Experiences

	Wol	Chan	June	Sung	Nick	Ming
Confidence in grammar?	Yes	Yes	No	No	Yes	Yes
Enjoy writing?	Yes	Yes	No	No	Informal writing only	No
L1 academic writing experience	Experienced	Very experienced	Inexperienced	Semi-experienced	Inexperienced	Experienced
Confidence in L2 writing?	Yes	Yes	No	No	Yes (very high)	Yes (high)
Uses of L1 in L2 writing	Used L1 mainly for organizing	Used L1 mainly for organizing	Thought in L1 first even for expressions	Thought in L1 first even for expressions	Rarely used L1	Used L1 mainly for organizing
Difficulties in L2 writing	Language issue, content knowledge	Idiomatic expressions, language issue	Organizational concerns	Rhetorical concerns	No major difficulties	Different writing culture
L2 writing processes	Careful drafting/writing, local revision	Whole composition, global revision	Little revision due to lack of time	Careful drafting/writing, local revision	Whole composition, global revision	Little revision due to lack of time
Writing foci / goals of L2 writing	Good writing beyond communicating	Genuine interest in writing	Get the ideas on paper	Get the ideas on paper	Communicating content	"Good enough" writing
Initial attitude to corpus use	Positive	Positive	Unsure	Negative	Very positive	Positive

June, the youngest participant, did not like writing in general and was inexperienced in L1 academic writing. For her, writing was just "stressful," as she had no successful experience in writing, even in Korean. As a science major, she was not given many opportunities to write papers. Most of her assignments were about computer programming, and she wrote reports that were preoccupied with numbers and mathematical formulae. Thus, she was not confident in writing in her L1, let alone her L2. In fact, she reported a great difficulty in L2 academic writing from the beginning. She also showed a lack of confidence in grammar. For her, L2 writing was a burden that required her to work hard to get across her points.

Sung had a diverse background in terms of life experiences, languages, and academic studies. He majored in Japanese linguistics in a Korean university and studied international politics for his master's degree in a Japanese university, writing his master's thesis in Japanese. At the time of this study he was pursuing his Ph.D. in history at an American institution. English was therefore his third language. Like June, Sung disliked writing in general. Similarly, his primary concern in writing was to get his ideas across on paper, with an emphasis on correct use of linguistic features.

As mentioned earlier, Nick had completed the first two courses of the writing program. Since that program incorporated corpus use into the curriculum, Nick was the only participant who had already been exposed to the corpus. In fact, he participated in the prior study, where he expressed a highly positive attitude toward corpus use. He did not like writing in his native language, and neither did he have any experience in L1 academic writing. Like June, Nick did not have many opportunities to write with words, but mainly worked with numbers and formulae in his science major. Regarding L2 writing, he enjoyed

informal correspondence, such as by email. He had great confidence in writing in English, although he did not enjoy it. For him, writing in English was not difficult. He said his confidence came from his experiences in writing courses.

The last participant, Ming, had extensive experience in Chinese academic writing from his college and graduate studies. With respect to L2 writing, Ming's experience was very similar to Nick's. Ming did not enjoy writing, but he liked shorter, more informal forms of writing, such as web-based chatting and emailing. He wrote only because he had to do it. However, he showed a great amount of confidence in his L2 writing. His primary focus in his writing was to communicate content to readers. He viewed the main purpose of writing as making himself understood by others. He did not care so much about text as long as his writing was "good enough."

With respect to the corpus, Wol, Chan, Nick, and Ming were initially positive toward its use. As noted earlier, Nick was highly enthusiastic toward the corpus. In contrast, June and Sung showed an unfavorable attitude toward corpora, albeit for different reasons: June had difficulty using the search technique, and Sung questioned the usefulness of the corpus over the dictionary.

It was apparent, from the beginning of the study, that the students' L2 writing praxis was an intricate picture of their L1 academic literacy experiences, L2 learning history, disciplinary content knowledge, and educational/cultural learning contexts.

FINDINGS

Students' Corpus Use in L2 Writing

This section reports the findings of the six students regarding their use of the corpus and their evaluations of its value in their L2 writing. The participants' corpus search logs, e-mail assignments, and interviews revealed their frequency of corpus use, the purpose of specific corpus searches, and their corpus use patterns while writing.

On the whole, Wol, Chan, and Sung used the corpus much more frequently than June, Nick, and Ming, as confirmed by the number of corpus search logs (19 pages and 11 pages on average, respectively) and also through interviews. The former three used it for other courses and their own needs in L2 writing, as well as for the writing class, while the latter three reported that they only used the corpus for class writing assignments. One factor that might explain this difference is their respective fields of study. The latter three were science majors, where they may have had less need for writing in their courses. On the other hand, the former three were non-science majors (i.e., education, history, and science education), fields likely to require more writing and a wider variety of styles.

The participants looked up the problematic words and patterns which they encountered frequently during the process of writing and revising essays for the course. [Table 3](#) shows some examples of the participants' main corpus search items. Many of them frequently searched for appropriate preposition usage, as indicated by their self-reports. The next most common use of the corpus was for correct usages and contexts of words. Such usages include questions about what kind of complements verbs take (e.g., clause or noun form), whether verbs are commonly used as active or passive forms (e.g., "consist of" vs. "is consisted of"), and which collocations the verbs take. The most frequently searched word class was verb form, which shows that the participants had the most interest or difficulty in verb usage.

Chan's corpus use here deserves discussion. As the most frequent user, his corpus use illustrated a wide range of corpus searches and considerable depth of analysis and interpretation. The other participants' corpus searches were mostly limited to so-called "substantial" linguistic elements for sentence construction, such as verbs, nouns and prepositions. Chan had a similar repertoire at the beginning, but expanded it to include "less crucial" linguistic features (e.g., adjectives and adverbs). His enthusiasm and passion about corpus analysis were quite noticeable throughout the study. He not only checked the corpus

to solve linguistic/writing problems, but he also browsed through the corpus, out of curiosity, to test whether the corpus would provide better expressions, even when he had no problem. He said, "I wanted to use the corpus because I was also curious about how well it will produce the results, whether there are better expressions, as well as in order to check whether mine is correct."

Table 3. Examples of Participants' Corpus Search Items

Purpose	Chan				Wol				Sung			
	Item	Remark	Helpful	Time ⁵	Item	Remark	Helpful	Time	Item	Remark	Helpful	Time
Usage/ Contexts of uses	regarding	to?	yes	8'	relate		yes	30"	regard	+clause?	yes	5"
	have difficulty	in + ing?	yes	15'	classify	prep also	yes	1'30"	pen(verb)		no	5"
	understanding	need	yes(++) ⁷	30'	influence	prep also	yes		embed		yes	3'
	(noun?/verb?)	"of"?			ground	prep also	yes		evaluate		no	3'
	addressing	appropriate?	yes(++)	10'	accompany	prep also	yes	30"	seem		yes	2'
	(noun?/verb?)	e/-ly?			absorb	prep also	yes		describe		yes	
	both in?/ in	proper	yes	7'	project	joinable	yes	1'	harbor(verb)		yes	5'
	both? ⁶	sequence?				verb			opaque		yes	
	on the contrary/		no	15'	become	joinable	yes		obscure		yes	
	to the contrary					verb			controversial		yes	3'
	in contrast/		no	30'	help	+ing?	yes	1'30"	encounter		yes	
	by contrast				rate(verb)				accuse	prep also	yes	1'
									reluctance		yes	1'
								clothe		yes	2'	
								consist	passive?	yes	3'	
V+N ⁸	review(noun)		little	10'					experience		no	1'
	summary		little	10'					contract		yes	5'
	war	verb?	yes	15'					damage			
	problem/issue	verb?	yes(+++)	20'								
discussion		yes	4'									
V+N								depict	what	yes	1'	
								enunciate	object?			
adj+N	frequency	high?	yes	3'	bias		yes	30"	approach		no	2'
					mistake							
adv+adj	lower	quite?	yes	2'								
adv+V	affect		yes	20'								
V+adj	feel	difficult?	yes	8'								

While Chan had a genuine interest in the corpus, the other participants perceived it more pragmatically as a problem-solving tool. It was a necessary inconvenience for them. Sung said, "I use it because I need it, not because I like it. I hope I can write without it." Ming's corpus use was also need-based, particularly for writing assignments. He emphasized he would use the corpus more frequently if he had more writing to do because it was only during writing that problems arose.

In fact, as Ming insisted, the participants' frequency of corpus use seemed to be related to the amount of writing tasks they had to complete. Table 4 shows each participant's number of writing assignments for each quarter. All of the participants had at least three writing assignments in the writing class in the first quarter. On the other hand, the amount of writing tasks in the second quarter, when they were no longer in a writing course, varied considerably among them. The table shows that the three science-major participants, June, Nick, and Ming, had no major writing tasks, although they sometimes wrote short lab reports. These three participants used the corpus infrequently.

As mentioned above, Nick and Ming were initially positive towards corpus use. Despite their positive attitudes toward the corpus, however, they actually used the corpus infrequently during the study time frame. Ming attributed this mainly to his lack of time, while Nick simply had few writing assignments. He simply did not have to use the corpus. Also, it seemed that his increased confidence in English writing

required less use of the corpus as time passed. Nonetheless, they indicated that they planned to use corpora more frequently when they did encounter more writing assignments and formal papers.

Table 4. The Amount of the Participants' Writing Assignments

Name	1 st quarter	2 nd quarter
Wol	3 writing class assignments 6 short papers for content courses	1 case study paper, weekly journal, 2 interview papers, 1 reflection paper
Chan	3 writing class assignments 1 major paper for content course	1 long research proposal, 5-6 page long weekly memo
June	3 writing class assignments Weekly journal for content course	Lab report (mainly mathematical formulae)
Sung	3 writing class assignments 2 papers for content courses	2 research papers
Nick	3 writing class assignments	No textual writing
Ming	3 writing class assignments	1 short proposal

June initially showed an unfavorable attitude toward corpora. Her attitude, however, became positive, with increased use. She appreciated the weekly corpus search assignments that gave her more opportunities to practice. This suggests that students may need to be exposed to technology for a certain period of time in order to effectively use it or like it. June's change to a positive attitude, however, did not prompt her to use corpora more frequently. In fact, June often struggled with corpus use. One reason was that she needed more training to use the search technique effectively. Also, her lower level of language proficiency hindered her corpus use. She experienced difficulty in putting the collocate words in correct order with the target words. During the study, she kept checking about whether her search and analysis were correct. As such, she reported that she wanted someone to help interpret the results and make the necessary patterns for her.

Interestingly enough, Sung, the only participant who initially showed a clearly negative attitude toward corpus use, turned out to be one of the most frequent corpus users. He generally turned in a two- or three-page search log per week while the other participants submitted one page on average. This was an unexpected finding. His studies in history required a great deal of writing, so he had a need for and a keen interest in improving his writing.

Some participants used the corpus while initially composing their writing assignments, while others used it only for revising. Interestingly, the more frequent corpus users, Wol, Chan, and Sung, used it for composing. The less frequent users' main purpose was in revision. June, who was in this category, reported that a key factor was its availability at the time of writing. However, she preferred using a dictionary for initial composing while reverting to the corpus for revision. Nick delayed his corpus use until the revision stage because he wrote his first draft by hand and then typed it into a computer when the corpus was available. He often marked problematic words in his handwritten draft, and then checked them in the corpus when revising.

With respect to the benefits of corpus use, most participants expressed similar points, such as learning common usage patterns and showing subtle nuances and contexts of usage. In other words, the students agreed that it provided textual help in writing. When corpora are viewed as a linguistic resource, one important question that arises is the precise role they play in language learning. The participants themselves asked profound questions regarding whether new learning would take place by corpus use. Their comments were revealing. Wol suspected that corpus use did not create new knowledge because she only used it to double-check or review whether her current knowledge was correct. If the data were inconsistent with her current knowledge, she just ignored it and did not expand her range of linguistic

performance. Her learning curve remained static. She said (all quotations from students are translations from their original Korean):

When I am looking for, say, a phrasal verb, I don't do guessing in advance. From my past rote learning experiences, I always try to recall what I learned. Even when I look up the corpus, I try to recite my memory from the rote learning, rather than guessing based on the data. So, for me, even guessing or checking just means checking whether my memory is correct. (Interview 5)

Chan asked the same question: "Which comes first? Do I analyze the data from the scratch or do I interpret the data just based on my prior knowledge?" He continued:

When I analyze corpus data, especially the collocate output, I often ask myself the question whether I think my prototype⁹ is correct based on the data or on what I've learned. I seem to use and interpret the data based on my prior knowledge. Therefore, I doubt whether I can interpret the data and construct prototypes if I don't have any grammar or word knowledge. (Interview 2)

Certainly, people refer to their prior knowledge to acquire new knowledge, and corpus analysis requires a certain level of prior grammar and word knowledge. As noted earlier, an interesting question is whether corpus use only confirms, reinforces, or serves to review the student's prior knowledge, or whether it extends the process to new learning. One clear finding from the study was that most of the participants did not use the corpus for learning new material. This point becomes more evident if we look at their corpus use behaviors. They rarely used the corpus for unknown words or phrases; rather, they used it for checking or extending their current knowledge about words. This might not seem surprising given their advanced level as L2 users. On the other hand, some reported that they checked the dictionary for definitions of unfamiliar words in order to obtain new information about meanings and usages. They viewed the corpus as a linguistic resource like a dictionary, as well as a linguistic checker.

In addition to providing actual textual help in writing, the corpus seemed to help the participants gain a psychological advantage in their language learning. Once they checked assignments against the corpus, the students seemed to feel more confident about their L2 writing. Chan said, "if I look up the corpus, I feel confident, because once I check it, I feel it's right and I feel comfortable." Ming also said, "I have confidence because I get common usage. I am sure I follow the common usage." According to Nick, "Because I know I have 40 sentences [from which] I can pick the best phrase, I feel confident because it's not mine and I know it's right." That is, if they consulted the corpus, they felt confident about using the common usage correctly, which could enhance their overall confidence in their writing. On the other hand, as noted earlier, Nick added that gaining more confidence in his English writing would, perhaps ironically, lessen his need to use corpora.

Changes in the Students' L2 Learning and Approaches to L2 Writing

Changes in the students' L2 learning

This section presents the findings concerning the participants' understanding of language learning acquired through the corpus approach and their later approaches to L2 writing. It is necessary, though, to be cautious about placing too much emphasis on the antecedents or determinants of the changes that were observed in the students' perceptions. In a qualitative inquiry like this, it may be misleading to conclude that the students' perceptions of language and L2 writing changed due only to corpus use experiences. In particular, the fact that corpus work comprised only part of the writing course makes it difficult to identify any conclusive evidence of changes in writing practices. Despite these caveats, certain similarities appear that point in the direction of the corpus' influence.

With respect to understanding of the target language, most participants expressed a combined concept of vocabulary and grammar, or "lexico-grammar" in technical terms, by the end of the study. For example, Chan initially had a strong grammar-based view of language, that is, "grammar is the core of the language and learning a language is learning grammar." He also held a clear distinction between words and grammar; words are for representing meaning, while the purpose of grammar is to connect those words. Later, however, his attitude toward language changed. He viewed grammar more through the concept of collocation.

Learning a language is to learn how the people of that language use the language. Basically, what we learned as grammar is all related to collocation. For example, we just learned "make use of" as a chunk, but the fact that it is not "make use in" or "make usage of" is based on collocation. (Interview 8)

Furthermore, for Chan, vocabulary, grammar, and usage (collocations or idioms) are all mixed concepts. He explained the relationship among those while drawing an insightful diagram (Figure 1):

In Korea, we taught "vocabulary" "grammar" and "idioms" separately. But they are not separate, but all one. Actually, we have to learn words focusing on expressions, and, in the middle, here is usage or collocation. Let's take an example of "make use of." In the past, we taught words and grammar separately. But we can teach them both; if we teach the word "make," teach like this (*circling vocabulary and usage together in the diagram*), and if we teach grammar, teach like this (*circling usage and grammar together in the diagram*). I think this is the main approach of collocation, and if we expand the approach, we can cover all of them. (Interview 8)

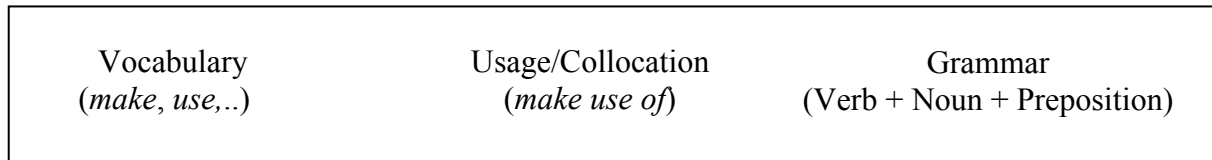


Figure 1. Chan's perception of collocation

While it is not clear whether the change in the students' view of language was solely the result of corpus use, the corpus approach that focuses on collocation and that intermingles form with meaning pushed the boundaries of grammar and lexis to a merged area and promoted positive perceptions of lexico-grammar. As advanced ESL students, their writing problems were often related to word usage rather than grammatical aspects, and their experiences with corpora enabled them to address these problems meaningfully.

Another important influence of corpus use on language learning was increased awareness of the importance of collocation and language sensitivity. Once participants were aware of the importance of collocations or common usage patterns, most of them reported that they began to pay more attention to the combinations of words in their reading as well as their writing. Chan reported that he started paying much more attention to the common expressions or collocations since beginning corpus use. The following is extracted from his reflection notes:

A change after corpus use is that I came to pay attention to the expressions that I ignored in the past. I usually focused on understanding content and didn't focus on word usage, except for some cases when I found beautiful expressions. However, after the quarter, I came to pay attention to the aspect. (Written reflections)

June paid close attention to usage patterns in her academic pursuits but also expanded this concern to her pleasure reading in English. She said:

When reading an English text, I focus on word usage. During the winter break, I read the novel "Big Fish." I used to read just for getting information, but at that time, I also looked at the usage. I am trying to get more familiar with the patterns. (Interview 5)

Unlike June, Wol did not consciously pay attention to common usage patterns, although she felt that her knowledge about collocations increased as she was exposed to various English texts. Wol added that expressions that became familiar through reading naturally came out in her writing. This reiterates a crucial point: exposure and noticing (whether it be conscious or unconscious) can be transferred to learning and writing.

In short, corpus use not only helped them to solve immediate writing/language problems, but also seemed to expand their language awareness and helped them with their language learning. In other words, developing the awareness that collocations exist or that they are important in language learning/writing is an educational process in itself. It leads learners to focus on those patterns, resulting in learning.

Changes in the students' approaches to L2 writing

At the beginning of the study, the participants perceived four areas as the main causes of writing difficulties: 1) insufficient command of the target language, 2) organizational and rhetorical concerns, 3) inadequate content knowledge, and 4) unfamiliar writing culture. By the end of the study, they still reported difficulties writing due to insufficient command of the target language. However, they noted improvement in the other areas and attributed it to writing instruction and writing practice during the first quarter. Therefore, they believed there to be progress in three of four main problem areas. The language difficulty area (#1 above) could not be so easily resolved.

On the other hand, by the second quarter, all but June reported that they were more confident about writing than in the previous quarter. They mostly attributed their success to three factors: 1) the writing course (partly corpus use), 2) more writing experience, and 3) their enhanced disciplinary/content knowledge.

Chan found L2 writing much less burdensome than in the previous quarter. He attributed this change to successfully finishing the final long paper in the writing course. In addition, his "bank of expressions" expanded through corpus use and writing practice. Ming agreed that writing in the second quarter was much easier due to the extensive practice offered in the class. Wol also said her writing became easier in the second quarter mainly due to her enhanced content knowledge. However, while writing may have become easier in general, she was frustrated at making the same mistakes in grammar and expressions. In other words, her intellectual appreciation of writing and approach to writing improved, but troublesome language issues lingered on.

While Sung also felt much more comfortable with writing later in the study, he still encountered grammatical difficulties. He tried to reduce the frequency of chronic grammatical mistakes. At the same time, he pointed out his lack of a variety of expression and how he tended to "stick to only familiar vocabulary and structures":

I felt much more comfortable about writing this quarter, and the process of writing also got easy. But I still have difficulties using articles and prepositions. Maybe they can never be fixed completely. I just try to get used to those uses and focus on them in revision to lessen the number of mistakes. (Interview 5)

June was the only participant who lost confidence in writing later in the study. The main reason was that her major field offered few chances to write in English, thus preventing her from gaining additional practice in writing. She felt her writing skills may even have declined because she did not have a lot of writing practice. She still faced various difficulties from linguistic issues to idea generation to organization.

Overall, the participants praised the advantages of corpus use in L2 writing. They commented that corpus use particularly helped them acquire the correct usage of words, which was a chronic problem in their writing. Wol and Sung valued the corpus over the dictionary when they wanted to check correct usages. The usefulness of the corpus was also reflected in the fact that they were at a loss when the technology malfunctioned at times in the second quarter. June did realize that the corpus provided an advantage over other references when the corpus became unavailable due to technical problems. As the most extensive corpus user, Chan felt helpless when the corpus was unavailable. He became used to editing his writing by using the corpus, but once access to it was lost, he just finished his writing with little revision. That is, the technology breakdown deprived him of a vital resource for editing. Without the corpus, he wrote without consulting a dictionary when he encountered trouble spots. On the other hand, while he showed a great level of corpus dependency throughout the study, he indicated that time and interest is more closely related to the reduction of writing errors:

I don't think corpus use directly reduces writing errors. Rather, I think the amount of errors is related to how much time I spend on revising during the writing process. I think we make mistakes, not because we don't know, but because we don't check. When writing, I have a sense that this may be wrong, but I don't check because I have no time, and then the teacher points out the error. So, corpus helps, but it's more an issue of whether we have time and willingness to check. (Interview 3)

The participants' overall writing process (drafting, composing, and editing) did not undergo dramatic changes as a result of corpus use. The general process remained the same, but there were minor changes. For example, students seemed to pay closer attention to word usage and collocation during writing and editing. While other factors, such as instruction, influenced their writing process, the use of corpus technology enabled them to include a self-editing step. For instance, Wol said corpus use helped her form a habit of checking and double-checking her writing. Previously, she did little revision. Another student, Ming, also commented on the editing step added to his writing process:

If I don't have corpus, I will not check after I write all the papers. But with corpus, I search on that instant in the corpus. (Interview 4)

Chan also noted the influence of the corpus on his writing process. He often checked the corpus for accuracy and clarity during writing, and so he reported a change not only in the process, but also in the quality of writing. He felt that corpus use gave him more confidence in his writing:

My approach to writing did not change all together from a big picture, but since the part of checking the corpus came in my writing process, the quality and process of my writing has changed to a certain degree. I came to check the corpus quite often during writing. I check the corpus to find the most appropriate expressions and depend on the corpus before I produce the final product. If I check the corpus, I feel more confident about the quality of my writing. (Interview 3)

June reported that her use of the corpus changed her understanding of language, which then changed her approach to writing. That is, after she realized that a word changes meaning depending on the context, she began to pay more attention to the uses of words when writing.

In short, once the corpus approach was introduced to the writing process, the participants took more responsibility for their writing by checking the corpus, and they approached writing with more ease and confidence.

DISCUSSION

The primary purpose of this study was to examine the ways corpus technology affects ESL students' L2 writing experiences. The findings revealed that the corpus approach heightened the students' language

awareness, which, in turn, affected their approaches to writing and the writing process. Regardless of their frequency of corpus use, their exposure to it made them aware of the importance of common usage and collocation in writing. That is, the corpus served as a meaningful reference for language input and also served as a catalyst in helping them to become more attentive to their writing.

The participants' overall writing process did not dramatically change after adopting the corpus. However, the general process underwent changes that were minor but useful. They formed a habit of checking their writing while composing, rather than writing only rough, unpolished drafts, and hence the base was built for independent learning. In other words, as the corpus approach was introduced and linked to the writing process, they took more responsibility for their writing. The fact that corpora were available also gave them more confidence in the quality of their final product. As such, their overall confidence in writing increased, and they approached writing with less emotional stress. The finding that they had more control over their own language learning and writing is an important point given that the main writing difficulties they encountered later were in the language domain.

As newcomers, the participants initially struggled with two things: 1) the language issue and 2) academic discourse familiarization – learning a different academic culture and its disciplinary writing practices. In particular, most of them had few experiences in academic writing in English. But, later, their enhanced knowledge about the content in their discipline and acculturation in the disciplinary environment made them feel that writing came easier to them. However, they still struggled while seeking the appropriate linguistic features to express their intended meanings. Therefore it appears that the linguistic domain remained a major challenge even for the advanced level students, who were well trained in composition skills. This finding lends support to Hinkel's (2002) call for directing greater attention to the linguistic features in L2 writing instruction. She emphasizes the need for addressing "the issue of language development, lexicon expansion, or sentence construction for NNSs [non-native speakers]" (p.56) in writing instruction. For L2 writers, the focus on content without taking into account their linguistic concerns may not lead them to become competent writers.

As a matter of fact, while current writing research has mainly addressed the so-called more global or discourse aspects of writing, such as content and rhetoric, "a lack of grammatical or lexical accuracy can [still] be a major issue for L2 writers" (Ferris & Hedgcock, 1998, p.274). While L2 writers are well trained in developing their ideas, the linguistic domain is often a major challenge for many of them. Grammar-focused instruction may not adequately prepare them for the linguistic demands of L2 writing. Therefore, L2 writing research and pedagogy should address this issue more fully in order to help students become more competent writers. Here corpus technology (e.g., general corpus concordancing) is a promising tool to help L2 writers deal with linguistic problems in writing. Tribble (1999) and Jabbour (2001) argue that the corpus approach not only raises learners' language awareness but also can contribute to an understanding of functions of linguistic features in context.

This study found that a wide array of individual experiences and contextual factors played an important role in determining the frequency and range of corpus use, selection of linguistic items for searches, the depth of analysis and interpretation, and thus the successful exploitation of corpus resources. The experiences and factors identified in this study were various: nature of writing experiences in L1 and L2, interest in writing improvement, characteristics of the field of study, need for the resources, familiarity with the corpus technology, time availability, and level of English language and writing proficiency. Noteworthy was the relationship between participants' frequency of corpus use and the number of writing assignments. The number of writing tasks varied among the students, and this affected their corpus use. This need-based attitude toward corpus use is a revealing finding. If the technology is not geared toward the students' immediate needs, it may not capture their interest despite its value in improving their writing. Hence, despite the usefulness of the technology, lack of meaningful engagement with writing would limit its appeal.

Also worth noting are the findings about the use of general corpora in EAP. Specialized corpora can be useful resources that present discipline-specific linguistic and discourse patterns in EAP writing contexts. At the same time, it is useful to recognize the strengths of general corpora over discipline-specific corpora in an EAP classroom for students from a variety of disciplines. Here it is important to recall that advanced L2 learners can acquire discourse level or rhetorical characteristics more quickly than linguistic features. While writing instruction can address the global level issues effectively, general corpora can be used to help students deal with their chronic, harder-to-acquire linguistic problems on their own. In particular, as seen in the participants' behaviors in this study, students can learn technical words specific to their disciplines through their own reading and content knowledge. This is consistent with Jabbour's (1997) point that students may be more familiar with the subject words than their EAP teachers, while those words may be irrelevant to the class as a whole. In sum, general corpora that present the most frequently occurring general words can be used effectively, because they cater to the needs of all the students in an EAP classroom.

Lastly, without challenging the value of the findings, some limitations of the study should be noted. This study primarily investigated students' writing experiences rather than examining their writing products in relation to corpus use. We cannot conclusively generalize from a limited number of participants. However, the qualitative approach helps us understand processes of learning that are not easily identifiable through quantitative methods. Some of the insights gained can be further examined in quantitative studies that investigate their applicability over a broader range and larger number of participants. A valuable future line of inquiry, for example, could examine whether corpus use can effect changes in the students' writing proficiency.

IMPLICATIONS FOR PEDAGOGY

The findings of the study provide significant implications for teaching L2 writing in an EAP classroom, especially where corpus use is integrated into instruction. While recent writing research mainly addresses the global or discourse aspects of writing, language issues should not be ignored. For L2 writers, the mastery of lexical and grammatical accuracy can contribute to an increased confidence in themselves as writers as well as a possible increase in the quality of their writing. These findings suggest a need for a pedagogy that accounts for a longer-term language learning process to acquire expressions and word usage than is recognized in conventional class preparation.

One especially important benefit of the corpus approach in this course was its focus on collocation patterns and typical contexts of word use. This focus on commonly used language chunks can help L2 learners acquire conventional use and fluency, which is often not achieved by studying structural rules. Thus, the study suggests a strategy that integrates lexico-grammatical features into language education and writing instruction. The combined concept of lexis and grammar can enhance students' repertoire of English expressions and usage in L2 writing.

A significant finding of the study is that students took more responsibility for their language learning as a result of their corpus experience. This is one of the most important roles that corpus technology plays in L2 writing. Corpora are tools that allow students to solve their linguistic and writing problems independently, and they raise students' linguistic awareness through problem-solving with authentic texts. This suggests that L2 writing instructors can incorporate the student-initiated corpus search as a supplement to classroom activities (rather than replace the conventional ways of teaching) in order to promote students' independence and self-monitoring.

In the present study, a wide variety of individual experiences and learning contexts were involved in deciding the level of the students' willingness and their degree of success in using corpora. Writing teachers who attempt to incorporate the corpus approach into their instruction need to understand the multi-faceted aspects of technology use that could facilitate or impede the individual students' L2 writing.

It is clear that not all students learn in the same way, and the new technology may not work equally well for all students. In particular, one important pedagogical question to be addressed is how to meet the needs of students who are at variant levels in their development of academic literacy, including those in the same course, who are presumed to have roughly the same level of L2 writing ability. For example, students' low level of grammar or language proficiency will probably interfere with their corpus use. L2 educators need to identify individual difficulties and needs in students' L2 writing and help the students build upon their strengths so as to develop skills that compensate for or overcome their weaknesses.

Serious thought should be given to ways to manage unexpected technology malfunctions that could occur during the course of instruction, a frustration that may inhibit student learning, as seen in this study when some students were left helpless after the online corpus broke down. It is imperative that students have comparable resources made available so they can continue studies in the event of a technological breakdown. Alternatives include making corpora materials available off-line, such as on a CD-ROM, or in dictionaries that are created using corpora data. Although such dictionaries do not allow students to use corpus resources to the fullest, they can at least provide them with the most common contexts of words, which is preferable to giving them out-of-context definitions.

CONCLUSION

When it comes to writing development, corpus-based activity is not the only or the best approach for all learners, but this study has shown it to be an important learning tool that has significant pedagogical potential in EAP writing contexts. Corpora can be used not only as a linguistic resource that helps students to solve immediate writing/language problems, but also as an important tool that encourages learners to become more independent L2 writers. If well planned, learning with corpora can enhance the learners' writing experiences and their confidence, and thus contribute to their overall writing development.

NOTES

1. This study adopted the approach used in Yoon & Hirvela (2004). See it for a detailed illustration of concordance work integrated into a writing class.
2. The names of the participants are pseudonyms to ensure confidentiality.
3. Student approximated years of study.
4. Ming's score is based on the former paper-and-pencil test, while the others are based on computer-based tests.
5. For the amount of time, <'> indicates minute, and <"> indicates second.
6. Chan searched the same item three times on different days.
7. The participant marked level of satisfaction.
8. For simple representation, linguistic class terms for the search are presented in acronyms. That is, *V* stands for verb, *N* for noun, *prep* for preposition, *adj* for adjective, and *adv* for adverb. Also, target searches are in bold. For example, **V+N** indicates that the participant searched the noun in order to find appropriate verbs that are commonly used with the noun.
9. "Prototype strings" are the most commonly used forms of word usage. The teacher taught the class how to use concordance and collocate data to construct "prototype strings" as a way of integrating corpus use with students' language learning.

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