Effects of a Corpus–Based Instructional Method on Students' Learning of Abstract Writing: A Case Study of an EAP Course for Engineering Students

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Abstract

The Corpus–based method has played a vital role in language teaching for more than four decades. A number of previous studies revealed its positive outcomes on language teaching and learning in various aspects such as on increasing students' vocabulary, raising their awareness of language use, developing their reading and writing skills in either general English courses or English for Specific Purposes or English for Academic Purposes courses (Johns, 1991a; Gilquinet al., 2010; Charles, 2012). However, to the best of the researcher's knowledge, most of the previous studies were conducted with high–proficiency students rather than low–proficiency students. None of these studies reported the effects of the corpus–based method on the non–native engineering students who have low–proficiency in English. Moreover, none of these studies revealed how to make the corpus–based method work effectively with this group of students. Accordingly, the present study was conducted to investigate the effects of the corpus–based method on low–proficiency engineering students and revealed their behaviors of learning through the corpus–based method in order to develop their abstract writing ability, thence recognizing the use of significant linguistic features in journal abstracts

and using them correctly when writing their own abstracts. The participants were 100 low–proficiency electrical engineering students who studied in an EAP course from a private university in Bangkok. The mixed method approach was used to collect data. Quantitative data was collected using a pre–test, a post–test, and questionnaires; and qualitative data was collected using interviews, student journals and teacher observations. The results revealed that the corpus–based method provides positive effects on low–proficiency engineering students in recognizing uses of significant linguistic features of the abstracts and in using the significant linguistic features correctly in composing an abstract. Besides, the students could develop their Data–Driven Learning Skills while learning through the corpus–based method. In addition, the students had rather positive attitudes towards this method. The findings from the present study will be useful for teachers or course designers in developing a pedagogical model of a corpus–based instructional method for low–proficiency students in developing their writing skills, especially in writing English for specific academic purposes.

Keywords: Data–Driven Learning, corpora, EAP writing, abstract, low–proficient students

บทคัดย่อ

กระบวนการเรียนรู้แบบ corpus-based method มีบทบาทสำคัญต่อการสอนภาษาอังกฤษมากว่า 40 ปี งานวิจัยที่ผ่านมาพบว่า กระบวนการเรียนรู้แบบ corpus-based method ช่วยให้ผู้เรียนด้านการเรียนรู้คำศัพท์ ช่วยให้ตระหนักถึงรูปแบบการใช้ภาษาที่ถูกต้อง และช่วยพัฒนาทักษะการอ่านและเขียนทั้งในการเรียนภาษาอังกฤษเพื่อวัตถุประสงค์ทั่วไป หรือการเรียนภาษาอังกฤษเพื่อวัตถุประสงค์เฉพาะหรือเพื่อวัตถุประสงค์เชิงวิชาการ (Johns, 1991a; Gilquin & Granger, 2010; Charles, 2012) แม้ corpus-based method สามารถช่วยในการเรียนรู้ภาษาในหลายด้าน ผู้วิจัยพบว่างานวิจัยที่ผ่านมามักศึกษาผลของกระบวนการเรียนรู้แบบ corpus-based method ที่มีต่อผู้เรียนที่มีความรู้ภาษาอังกฤษอยู่ในระดับสูง แต่ยังไม่มีงานชิ้นใดรายงานผลของกระบวนการเรียนรู้แบบ corpus-based method ที่มีต่อผู้เรียนที่มีความรู้พื้นฐานภาษาอังกฤษอยู่ในระดับต่ำ ดังนั้นงานวิจัยชิ้นนี้จึงจัดทำขึ้นเพื่อศึกษาผลของกระบวนการเรียนรู้แบบ corpus-based method ที่มีต่อนักศึกษาวิศวกรรมไฟฟ้าที่มีความรู้ภาษาอังกฤษในระดับต่ำ และศึกษาพฤติกรรมการเรียนรู้ของนักศึกษาเหล่านี้เมื่อเรียนรู้ผ่านกระบวนการเรียนรู้แบบ corpus-based method เพื่อพัฒนาทักษะการเขียนบทคัดย่อภาษาอังกฤษ ซึ่งประกอบไปด้วย ความสามารถในการตระหนักถึงการใช้คำสำคัญในบทคัดย่อ และสามารถใช้คำเหล่านั้นได้อย่างถูกต้องในบทคัดย่อของตนเอง กลุ่มประชากรคือ นักศึกษาวิศวกรรมไฟฟ้าที่มีความสามารถทางภาษาอังกฤษอยู่ในระดับต่ำ จำนวน 100 คน ซึ่งลงทะเบียนเรียนวิชาภาษาอังกฤษเพื่อวัตถุประสงค์เชิงวิชาการ มีการเก็บข้อมูลโดยใช้ แบบทดสอบก่อนเรียนและหลังเรียน แบบสอบถาม สัมภาษณ์ บันทึกการเรียนของนักศึกษา และแบบสังเกตของครู ผลการวิจัยแสดงให้เห็นว่า กระบวนการเรียนรู้แบบ corpus-based method สามารถช่วยให้ผู้เรียนที่มีความรู้พื้นฐานภาษาอังกฤษในระดับต่ำตระหนักถึงการใช้คำสำคัญในบทคัดย่อได้ และสามารถใช้คำเหล่านั้นได้อย่างถูกต้อง นอกจากนี้ นักศึกษาเหล่านี้ยังสามารถพัฒนาทักษะ Data-Driven Learning ได้ เมื่อเรียนรู้ผ่านกระบวนการเรียนรู้แบบ corpus-based method นอกจากนี้ ผู้เรียนยังมีทัศนคติที่ดีต่อกระบวนการเรียนรู้แบบ corpus-based method อีกด้วย ผลการวิจัยครั้งนี้จะเป็นประโยชน์ต่อผู้สอนที่ต้องการพัฒนา

model กระบวนการเรียนรู้แบบ corpus-based method สำหรับผู้เรียนที่มีความสามารถทางภาษาอังกฤษอยู่ในระดับต่ำ โดยเฉพาะอย่างยิ่งเพื่อพัฒนาทักษะการเขียนภาษาอังกฤษเพื่อวัตถุประสงค์เฉพาะเชิงวิชาการ

คำสำคัญ: การเรียนโดยใช้คลังข้อมูลภาษา คลังข้อมูล การเขียนภาษาอังกฤษเพื่อวัตถุประสงค์เฉพาะเชิงวิชาการ บทคัดย่อ ผู้เรียนที่มีความรู้พื้นฐานภาษาอังกฤษอยู่ในระดับต่ำ

Introduction

Academic writing is considered one of the most important skills for students who have to write in academic contexts. However, it is a skill that is difficult for ESL/EFL students to develop by themselves. Furthermore, it is a skill that requires appropriate teaching approaches and effective practices (Lenneberg, 1967; Chen, 2005). The teaching of English for Academic Purposes can be classified into English for General Academic Purposes (EGAP) and English for Specific Academic Purposes (ESAP) (Hyland, 2006). These two approaches have different aims, thus also share different emphases. The teaching of EGAP writing was aimed at helping the students write general academic texts by emphasizing general writing tasks such as summarizing, paraphrasing and synthesizing. The teaching of ESAP writing, on the other hand, was aimed at helping students write acceptably specific texts in their own discipline by emphasizing the characteristics of language that are used differently in each discipline, such as characteristics of legal language or language uses in specific areas of engineering (Halliday et al., 1964; Jordan, 1997; Dudley–Evans & St John, 1998; Hyland, 2006). With this emphasis, genre analysis has played an important role in ESAP writing for decades. In ESP, genre analysis is an activity to identify a class of communicative events of a text in a particular setting. Thus, it reveals the distinctive and recognizable patterns and norms of an organizational structure and serves as communicative functions shared by members of the same community. In pedagogy, an application of genre analysis into writing class is known as genre–based writing instruction. It is an approach that provides an explicit writing model and particular language for the students based on the outcomes from its analysis (Silva, 1990; Cope &Kalantzis, 1993; Jordan, 1997; Henry & Roseberry, 1998), and it was reported to work effectively in teaching ESAP writing (Burns & Joyce, 1997; Swales & Feak, 2004; Yan, 2005; Na, 2007; Chen and Su, 2012; Huang, 2014).

Although the genre−based method, which presents the macro−structure of the text, has reported providing positive effects on students' writing practice, it requires a corpus as a tool to make the significant linguistic features more noticeable as well as to provide concrete statistical evidence to support the findings (Loudermilk, 2007; Kanoksilapatham, 2011; 2015; Tribble & Wingate, 2013). Apart from providing the statistical data, the corpus itself has also played an important role in language teaching either directly or indirectly for more than four decades. The indirect use of corpus in language teaching is known as the corpus−based method or corpus−informed method (Flowerdew, 1993; Coniam, 1994; Coxhead, 2000, 2002) and the direct use of a corpus is known as Data−Driven Learning (DDL) (Johns, 1986; 1991a; Bernardini, 2002). The DDL approach has been conducted and reported to work effectively with high−proficiency students (Johns, 1986, 1991, 1997; Steven, 1991; Cobb, 1997; Cobb and Horst, 2001; Bernardini, 2002; Tian & Liu, 2004; Yoon & Hirvela, 2004; Lee, 2011; Charles, 2012).

However, to the best of my knowledge, there has been no study reporting its effects on low−proficiency students, especially in instructing ESAP writing. In addition, none of the previous studies observed the students' learning process when learning through the DDL closely. Accordingly, in the present study, the researcher designed a corpus−based instructional approach specifically for low−proficiency students by integrating the principles of the corpus−based method, the DDL approach and the genre−based method, and tested its effects on the students' learning of significant linguistic features of abstracts and their ability to apply them in their abstract writing. In addition, it was conducted to study whether, how much and how the low−proficiency students developed their DDL skills.

Research Questions

1. Does the corpus–based instructional method increase low proficient students' performance in writing an abstract in electrical engineering?
   1.1 Can the students recognize correct uses of the significant linguistic features in each move of an abstract?
   1.2 Can the students write an abstract with correct use of the significant linguistic features to represent each move?

2. To what extent does the corpus–based instructional method develop the students' Data–Driven Learning skill in learning significant linguistic features and applying them in their abstract writing?
   2.1 To what extent does the corpus–based method encourage the students to play active roles in class?
   2.2 To what extent does the corpus–based method encourage the students to raise questions and queries about moves and linguistic features?
   2.3 To what extent does the corpus–based method encourage the students to design and manage their own search?
   2.4 To what extent does the corpus–based method encourage the students to use the corpus to discover how significant linguistic features are commonly used in each move by answering the prepared questions by themselves?
   2.5 To what extent does the corpus–based method encourage the students to hypothesize, analyze, summarize and verify while discovering how significant linguistic features are commonly used in each move?

2.6 To what extent does the corpus–based method encourage the students to learn significant linguistic features in each move of an abstract through corpus both inside and outside of the classroom?

3. What are students' attitudes towards the learning of abstract writing using the corpus–based instructional method?

Literature Review

Genre–Based Writing Instruction

Genre analysis is a type of discourse analysis. It has been used to analyze and describe texts using different linguistic and non–linguistic techniques developed in different schools of genre analysis, which are New Rhetoric Studies, Australian Systemic Functional Linguistics and English for Specific Purposes (ESP). Due to its context of study, only the ESP approach was emphasized in this study as it has been arguably the most influential in analyzing as well as introducing genre structure and particular language to new writers in ESP and EAP contexts (Swales, 1990, 2004; Bhatia, 1993, 1999, 2004; Flowerdew, 2002; Hyland, 2003; Johns, 2003).In ESP, genre was defined as a class of communicative event, which a member of the same community shared a set of communicative purpose(Swales, 1990). Genre analysis has been viewed as a tool for analyzing and teaching written and spoken language for non–native learners particularly in academic and professional contexts (Swales, 1990; Bhatia, 1993; Flowerdew, 2002). It emphasizes the discourse construction and the characteristics of language used in a particular context with less attention focused on the social contexts. It also explores and reveals the smallest meaningful unit of a discourse that reflects the writers' communicative purposes known as moves, and key linguistic features that are used to represent each move of a genre (Swales, 1990;

Bhatia, 1993; Hyon, 1996; Connor&Mauranen, 1999; Henry and Roseberry, 2001). A model that is well−known and has been playing an important role in the analysis of academic texts is Swales' CARS model. It has been applied widely to explore rhetorical structures of academic work and a part of research articles in various fields (e.g., Holmes, 1997; Samraj, 2002, 2008; Lim, 2006; Promsin, 2006; Ozturk, 2007). In addition, the CARS model has been applied to investigate the rhetorical structure of the abstract (e.g., Martin, 2003; Samraj, 2005; Promsin, 2006), and the results from the previous studies revealed that the rhetorical structure of the abstract is compatible to the Swales' CARS model. See CARS model and its implication in identifying moves of abstracts in different disciplines.

CARS model (Swales, 1990)	Conservation Biology (Somraj, 2002)	Wildlife Behavior (Somraj, 2002)	Engineering (Promsin, 2006)
Move 1 Establishing a territory *Step 1* Claiming centrality and/or *Step 2* Making topic generalization(s) and/or *Step 3* Reviewing items of previous research	Move 1 Establishing a territory *Step 1* Claiming centrality *Step 2* Making topic generalization	Move 1 Establishing a territory *Step 1* Claiming centrality *Step 2* Making topic generalization	Move 1 Establishing a territory *Step 1* Claiming centrality *Step 2* Making topic generalization *Step 3* Reviewing items of previous research

CARS model (Swales, 1990)	Conservation Biology (Somraj, 2002)	Wildlife Behavior (Somraj, 2002)	Engineering (Promsin, 2006)
Move 2 Establishing a niche *Step 1A* Counter–claiming *Step 1B* Indicating a gap *Step 1C* Question–raising *Step 1D* Continuing a tradition	Move 2 Establishing a niche *Step 1B* Indicating a gap	Move 2 Establishing a niche *Step 1B* Indicating a gap	Move 2 Establishing a niche *Step 1B* Indicating a gap or *Step 1D* Continuing a tradition
Move 3 Occupying the niche *Step 1A* Outlining purposes or *Step 1B* Announcing present research *Step 2* Announcing principal findings *Step 3* Indicating research article structure	Move 3 Occupying the niche *Step 1A* Outlining purposes *Step 1B* Announcing present research *Step 2* Announcing principal findings * Conclusions	Move 3 Occupying the niche *Step 1A* Outlining purposes *Step 1B* Announcing present research *Step 2* Announcing principal findings * Conclusions	Move 3 Occupying the niche *Step 1A* Outlining purposes *Step 1B* Announcing present research *Step 2* Announcing principal findings *Step 3* Indicating research article structure

Table 1: CARS model and its implications in identifying moves of abstracts in different disciplines

Genre−based writing instruction has been used widely in teaching ESP/EAP writing since the mid−1980s (Henry & Roseberry, 1998; Yan, 2005).The main objective of the genre−based instruction is to raise students' awareness of rhetorical structure and the linguistic features of a specific genre. Moreover, it is aimed to provide an explicit writing model and particular language for the students to apply when they write their own work (Cope & Kalantzis, 1993; Henry & Roseberry, 1998). This approach encourages the students to analyze structures and language of a genre or different genres to help them understand how the genre is constructed and with what language elements used. Then, they are encouraged to write their own work, which must be compatible to the professional writers in the field (Cope &Kalantzis, 1993; Henry & Roseberry, 1998; Badger & White, 2000; Yan, 2005).Genre−based instruction has been implemented to teach writing in various ESP and EAP contexts (e.g., Na, 2007; Chen & Su, 2012; Huang, 2014). However, not many studies have revealed its effects on teaching academic abstract writing. Accordingly, the present study was conducted to reveal its effects by integrating its principle with the corpus−based and DDL approach.

Corpus−Based Method

Corpus is a large collection of authentic texts in a computer−readable format, which is created according to specific criteria (Sinclair, 1991; McEnery & Wilson, 2001; Bowker & Pearson, 2002; Hunston, 2002). In language analysis, a corpus provides both qualitative and quantitative results. Besides, its presentation, which is non−linear, it provides language researchers different views and awareness of language (Hunston, 2002). Corpus analysis has been brought into language teaching either directly or indirectly for decades. The students' indirect corpus consultation was known as corpus−based method. The students' direct corpus consultation was known as the Data−Driven Learning (DDL). In the corpus−based method, the corpora are consulted most

by the teachers of the courses in designing a syllabus and courses (Flowerdew, 1993), creating a test (Coniam, 1994; Shillaw, 1994), and improving teaching contents and materials (Coxhead, 2000, 2002; Wang et al., 2008). In the meantime, the corpora are also used to present a large amount of authentic data to the students (Flowerdew, 1993; Leech, 1997; O'Keeffe et al., 2007). Its teaching methodology applies the principles of deductive approach. The teachers are the ones who consult the corpus directly to select contents, prepare lessons and present corpus data to the students (Sinclair, 1987). This method was reported to provide positive effects on students' language learning; however, it was claimed as limiting the corpus potential, students' learning ability and students' independent–study skill (Johns, 1991a; Bernardini, 2002). To fill this gap and make use of the full potential of corpus, the DDL approach was primarily introduced by Johns in 1986.

Data–Driven Learning (DDL)

With a notion that students can learn best when they recognize their own strategies to discover about the language or to be able to learn how to learn, Johns (1986) introduced Data–Driven Learning (DDL) to give learners a chance to explore a corpus by themselves. The principle behind the DDL approach was to promote inductive learning. In the earlier period, the DDL approach was developed under the concept of "language learner as researcher" and "every student a Sherlock Holmes" (Johns, 1986, 1997). Since then, the DDL approach has been recognized by a number of teachers and has been brought into the language classrooms. It was revealed that the DDL approach had provided positive effects on both the learning of vocabulary and grammar (Cobb and Horst, 2001) and the developing of students' reading and writing ability (Steven, 1991; Cobb, 1997; Tian & Liu, 2004; Yoon & Hirvela, 2004). More recently, the DDL approach has been advanced to be more inductive by Bernardini (2002). In

Bernardini's DDL, students are defined as travelers, who can make a decision about their own journey without any teacher's control. They can take any direction that they want and can go as far as they are able to. In other words, the students are expected to make a decision in every step of their own learning and investigate language to serve their own interests. Both Johns and Bernardini's DDL approaches have been implemented in various language classrooms and the positive effects have been shown (e.g., Cheng et al., 2003; Yoon & Hirvela, 2004; Johns et al., 2008; Lee, 2011; Charles, 2012). However, these studies were conducted with high-proficiency students. None of these studies revealed whether the DDL approach could work effectively with low-proficiency students and what process should be applied to make it effective for low-proficiency students. Moreover, the previous studies did not study the students' process in learning through the DDL approach closely; neither did it report how DDL skills were developed and how much the students could develop them.

Research Methodology

Participants

The participants were 100 Electrical Engineering undergraduates who enrolled in a Technical English course at a private university of Science and Technology in Bangkok, Thailand. They were required to study four English courses throughout their entire four years of university. Each English course was taught for 2.30 hours per week in a fifteen-week semester. It was discovered from their syllabus that they had quite limited time to improve and develop their English language skills at the university. Most of the students felt that they could not improve and develop their skills of English appropriately. These students were asked to take a commercial proficiency test that was created to categorize the students according to their levels of proficiency before the course started. The students' test scores were from 9 points to 30 points out of 60 points. According to the test

descriptions and scale, they were categorized as beginner, elementary and lower intermediate levels. In this study, they were representatives of low−proficiency students. This group of students was purposively selected as participants in this study because they have to write an academic abstract in English for their senior project to fulfill their degree.

Research Design, Procedure and Instruments

The mixed method approach, a combination of the quantitative method and qualitative method, was implemented in the present study. Quantitative data was gathered using the pre−test and post−test and questionnaires, and qualitative data was gathered using the questionnaires, interviews, student journals and teacher's observations. To conduct the research, all of the following course and materials were initially prepared: corpus of Electrical Engineering Abstracts, corpus analysis tool, AntConc, corpus−based exercises and lesson plans. The corpus data was gathered from 350 abstracts published in five reliable journals found on the IEEE Explorer website: www.ieee.org during 2000−2012. Genre analysis applying the CARS model as a framework was conducted with the collected abstracts. The results from genre analysis were validated by four validators. After that they were used to categorize the corpus into sub−corpora. The structure of the corpus can be seen in Table 2.

Corpus of Electrical Engineering Abstracts (54,408 words)		
Sub–corpus of Move 1: Establishing a territory (5,114 words)	Sub–corpus of Move 2: Establishing a niche (4,108 words)	Sub–corpus of Move 3: Occupying the niche (45,186 words)
Sub–corpora of • *Step 1* Claiming centrality (2,959 words) • *Step 2* Making topic generalization (1,882 words) • *Step 3* Reviewing items of previous research (273 words)	Sub–corpora of • *Step 1A* Counter–claiming (347 words) • *Step 1B* Indicating a gap (3,612 words) • *Step 1D* Continuing a tradition (149 words)	Sub–corpora of • *Step 1A* Outlining purposes (7,631 words) • *Step 1B* Presenting framework (342 words) • *Step 1C* Describing methodology (25,853 words) • *Step 1D* Validation of results (2,597) • *Step 2* Announcing principal findings (7,529 words) • *Step 3* Indicating research article structure (277 words) • *Step 4* Discussing applications (957 words)

Table 2: Structure of the corpus

The course contents were structured based on the moves of the abstracts, so there were three main lessons for the students to learn: Moves 1, 2 and 3. After that, the significant linguistic features were extracted from each sub–corpus and designed as corpus–based exercises for the students to improve their discovery learning ability. In total, there were fifteen activity sheets used in the present study. There were three activity sheets implemented when the students learned each move. The exercises started from more close questions such as gap–filling and multiple choices to more open questions such as

discussion. The first exercise in each Move was to introduce new terms to the students using teacher–initiation. The second exercise was to encourage the students to investigate collocations, patterns and uses of the significant terms using the collaborative learning approach. The third exercise was to encourage the students to explore more about the use of the significant terms and applying them to their writing at sentence level using student–centered approach. After that, there were writing tasks designed for the students to practice in writing practice session. All of the materials were validated by experts in the field of language teaching as well as genre analysis.

Since the students were low in terms of their proficiency of English, the corpus–based instructional method was designed to consist of three stages: teacher–initiation, collaborative learning and student–centered learning. The teacher–initiation was aimed to introduce new terms to the students with the teacher as a guide. Then, they were free to investigate collocations, patterns and uses of the significant terms with or from their group members. After that, they had to discover use of significant terms independently. Finally, they had to practice writing independently. Along these processes, corpus was the students' main instrument. In other words, the students consulted the corpus to complete the corpus–based exercises.

Secondly, research instruments were prepared. The pre–test and post–test were designed based on the results from the corpus analysis and genre of abstract writing. The questionnaires, interviews, student journals and teacher's observations were designed to consist of the questions that were necessary for answering the three research questions of the present study. These instruments were piloted with a group of Electrical Engineering students who were compatible to the participants, and then they were validated by experts in the field of language teaching. Thirdly, the research was conducted in the academic year of 2013 with the participants for fifteen weeks. See an overview of the teaching and techniques of data collection in Table 3 in the next section.

Data Collection

The data in the present study were collected using five instruments: pre–test and post–test, questionnaires, interviews, teacher's observation and student journals. See an overview of the data collection from Tables 3 and the sequence of data collection from Table 4.

Research Questions	Research Instruments				
	Pre–post test	Questionnaire	Interview	Teacher observation	Student journal
1. Does the corpus–based instructional method increase low proficiency students' performance in writing an abstract in electrical engineering?	x				
2. To what extent does the corpus–based instructional method develop the students' Data–Driven Learning skills in learning significant linguistic features and applying them in their abstract writing?		x	x	x	x
3. What are students' attitudes towards the learning of abstract writing using the corpus–based instructional method?		x	x		x

Table 3: An overview of data collection

Week	Content	Research Instruments				
		Pre–post test	Questionnaire	Interview	Students' journal	Teacher observation
1	Introduction to corpus and corpus–based method	x	x			
2	Introduction to abstract writing & Move analysis		x			x
3	Move 1 Terms, Grammar & Writing Exercises (Teacher–initiation)					x
4	Move 1 Terms, Grammar & Writing Exercises (Collaborative learning)					x
5	Move 1 Terms, Grammar & Writing Exercises (Student–centeredness)		x	x	x	x
6	Move 2 Terms, Grammar & Writing Exercises (Teacher–initiation)					x
7	Move 2 Terms, Grammar & Writing Exercises (Collaborative learning)					x
8	Move 2 Terms, Grammar & Writing Exercises (Student–centeredness)		x	x	x	x
9	Move 3 Terms, Grammar & Writing Exercises (Teacher–initiation)					x
10	Move 3 Terms, Grammar & Writing Exercises (Collaborative learning)					x
11	Move 3 Terms, Grammar & Writing Exercises (Student–centeredness)		x	x	x	x

Week	Content	Research Instruments				
		Pre–post test	Questionnaire	Interview	Students' journal	Teacher observation
12	Workshop I (Student–centeredness)					x
13	Workshop II (Student–centeredness)					x
14	Workshop III (Student–centeredness)		x	x	x	x
15	Workshop IV (Student–centeredness)					
16		x				

Table 4: Sequence of data collection

To answer the first research question regarding students' performance in learning the significant linguistic features in the abstracts and composing an abstract with correct uses of those terms, the data were gathered from the pre–test and post–test. The pre–test was used before the course began, and the post–test was used after the course was completed. The test consisted of multiple–choice task, matching task, error correction and writing task. To answer the second and third research questions regarding students' Data–Driven Learning skills and students' attitudes, respectively; the data was collected using the questionnaires, semi–structured interviews and student journals, which were administered after the completion of each lesson (four times in total), while teacher's observations were conducted every week.

The questionnaires relating to the quantitative data consisted of Likert-scale questions (e.g., strongly agree, agree, neither agree or disagree, disagree, strongly disagree), Dichotomous Questions (e.g., yes, no, unsure), and Rating Scale Questions (e.g., very good, good, fair, poor, very poor).The questionnaires consisted of three main sections. The first section had to do with DDL skills. The second section was regarding attitudes and the last section was open-ended. All three sections were conducted on a population of one hundred students. The semi-structured interviews were conducted on thirteen students, who purposively selected from their learning behaviors. Five out of the thirteen always played active roles, raised questions or made queries and developed the ability to design and manage their own search. Six out of the thirteen played active roles and managed to develop the ability to design and manage their own search, but less frequently raised questions or made queries, and one of them rarely raised questions or made queries at all. Two of the thirteen played passive roles, never raised questions nor made queries and did not develop the ability to design and manage their own search. The interview questions were raised in accordance with the questions in the questionnaires as to investigate in-depth information. The students were asked to reflect and report on their learning process, their behaviors, and their attitudes toward the teaching in their journals. The students were free to write in the space provided. The teacher's observation was conducted every week to observe students' learning behaviors using a field note and a video recorder.

Data Analysis

The gathered data from the pre-test and post-test were statistically compared using the *t*-test, which was implemented under the SPSS. It was used to test whether the differences between the pre-test and post-test results were significant at the 0.05 level (Hatch

&Farhady, 1982). The statistical data from the questionnaires were also calculated using the SPSS. In addition, the descriptive data from the open−ended questions of the questionnaires, interviews, student journals and teacher observation were identified, coded and categorized (Schutt, 2011). The qualitative data from the open−ended section of the questionnaires, interviews, student journals and teacher observations were used to support or refute the statistical results from the pre−test and post−test and questionnaires.

Results and Discussion

Learning Effects

To answer the first question, the results regarding the effects on students' learning were discussed based on the students' ability to recognize correct uses of the significant linguistic features in each step of each move of the abstract, and their ability to apply their knowledge of the correct uses of those features in their abstract writing.

Students' Ability to Recognize Correct Uses of the Significant Linguistic Features in Each Step of Each Move of the Abstract

To explore the students' ability to recognize the correct uses of significant linguistic features, including collocations, patterns, tense, voice and uses, data was collected using the first three parts of the pre−posttest, which consisted of multiple−choice, matching and error correction tasks. After this, the data was analyzed using dependent sample *t*−test, which was implemented under the SPSS. The statistical results revealed that there was a significant difference between the students' pre−test and post−test scores at the 0.05 level; $p = 0.00$, $t = -8.424$. See Table 5:

Section	Test	N	Mean	SD	t	p
1 Multiple choice (10 points)	pre	100	2.01	1.425	−8.526*	.000
	post	100	3.84	1.889		
2 Matching (10 points)	pre	100	1.11	0.942	−3.272*	.001
	post	100	1.73	1.717		
3 Error correction (10 points)	pre	100	1.52	1.096	−4.195*	.000
	post	100	2.15	1.480		
Total (30 points)	pre	100	4.64	2.057	−8.424*	.000
	post	100	7.72	3.604		

Table 5: Dependent sample *t*−test for pre−posttest scores (part 1)

It could be interpreted generally that the students had higher proficiency in recognizing the correct uses of significant linguistic features in the abstract after learning through the corpus−based method. Although results revealed that student skills improved, it was evident that the mean score of 7.72 out of 30 points for the whole class was rather low. When observed more specifically, the results indicated that, on one hand, 77 students' scores in the post−test were higher than their scores in the pre−test. The greatest increase for any of the participants was 14 points. On the other hand, the scores of the other 23 students did not indicate improvement; 11 of them received the same score in the pre−test and post−test and 12 of them received lower scores. It can be concluded that according to the students' pre−test and post−test scores, the majority of the students could recognize correct uses of the significant linguistic features of each move of the abstract. However, there were still some other students whose scores did not indicate any improvement. The possible factors that might

have caused the limitation in improving their learning ability could be their familiarity and preference with the traditional deductive approach rather than the current inductive approach, their unfamiliarity of the corpus–method, the difficulty and complexity of the data presented in the corpus, and their inattention.

Students' Ability to Apply Their Knowledge of the Correct Uses of Significant Linguistic Features in Their Abstract Writing

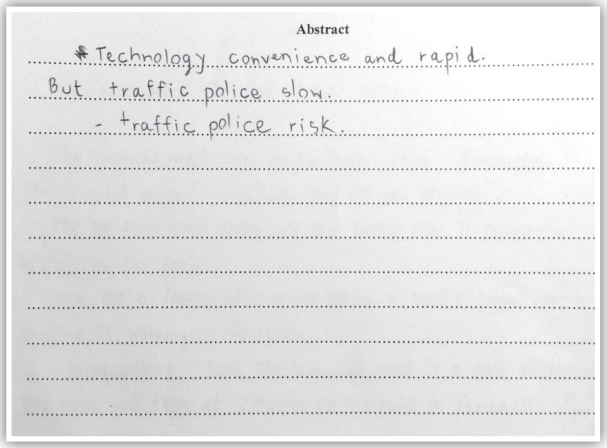
To explore students' ability to apply their knowledge of the correct uses of the significant linguistic features in their abstract writing, data was collected using the written task in the pre–posttest, in which the students were asked to write an abstract from the provided information. Their writing was assessed on organization, content, vocabulary, correct use of linguistic features and correct use of general language, after which, the data was analyzed using the dependent sample *t*–test, which was implemented under the SPSS. The statistical results revealed that there is a significant difference between the students' pre–test and post–test scores at the 0.05 level; $p = 0.00$, $t = -7.511$. See Table 6:

part	Test	N	Mean	SD	t	p
2	pre	100	1.41	3.219	−7.511*	.000
	post	100	5.19	6.188		

Table 6: Dependent sample *t*–test for pre–posttest scores (part 2)

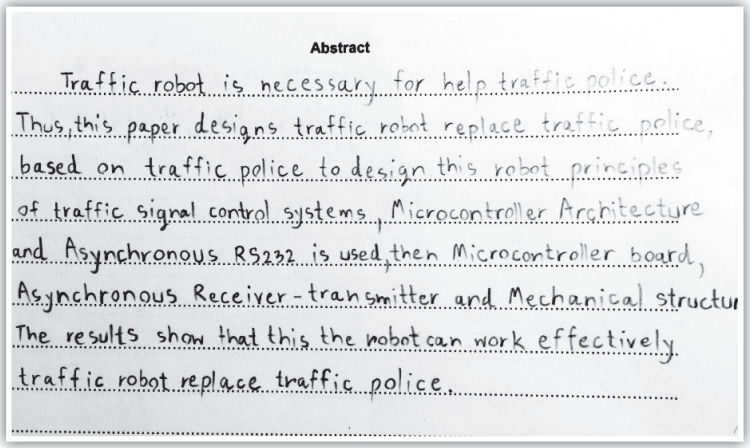
This indicates that the students improved significantly in applying their knowledge of uses of significant linguistic features to their own writing when learning through the corpus–based instructional method. The highest score amongst the students was 20 out of 25 points, which means this student could write an abstract more efficiently.

The greatest improvement amongst the students was 16.67 points. Note the pre− and post−writing of the student with the highest improvement in Figure 1 and 2 below:


Abstract

* Technology convenience and rapid.
But traffic police slow.
- traffic police risk.

Figure 1: Beginner Student No.88's pre−writing


Abstract

Traffic robot is necessary for help traffic police...
Thus, this paper designs traffic robot replace traffic police,
based on traffic police to design this robot principles
of traffic signal control systems, Microcontroller Architecture
and Asynchronous RS232 is used, then Microcontroller board,
Asynchronous Receiver-transmitter and Mechanical structu
The results show that this the robot can work effectively
traffic robot replace traffic police.

Figure 2: Beginner Student No.88's post−writing

However, similar to their ability to recognize the correct uses of the significant linguistic features, the mean score of the entire class on this part was quite low at 5.19 out of 25 points. The students' mean score was quite low attesting to the fact that the majority of the 46 students was 0 out of 25 points. A possible factor accounting for preventing the students from improving their ability to transfer their knowledge to their writing could be the limitation time allotted to them to practice. Several students commented during their study and in the interviews that the course should be extended to 30 weeks or two semesters since a 15 week period was not enough to learn both linguistic features and writing. Moreover, closer assistance from the teacher was required since this was their first time to write formal academic work. Due to the large class size of 100 students and the possibility that there would be students who could not connect lessons they had learned to new writing tasks, well−trained teaching assistants were required.

Learning Process

To answer the second research question, results relating to the students' learning process were discussed based on six of the following DDL characteristics:(1) playing an active role in class, (2) raising questions and queries about the language, (3) designing and managing their own search, (4) discovering about the language by themselves, (5) hypothesizing, analyzing, summarizing and verifying the data, and (6) learning by themselves both inside and outside of the classroom (Johns, 1991a, 1991b, 1997; Bernardini, 2000; Hunston, 2002).

Students' Active Role

In this present study, the corpus−based method was designed to encourage the students to play the role of language investigators who consulted the corpus to find out about the language by themselves. The results from the questionnaires, interviews, student learning journals

and observations revealed similarly that the students were active and eager to learn when they did so through the corpus-based method. Questionnaire scores at an above moderate level of 3.96 points indicated that students agreed that the corpus-based method encouraged them to play an active role in class. They also revealed in the interviews that they became active learners because the corpus-based method gave them more opportunity to work independently.

"This approach was a better choice. It was better than the approach that I had studied for twenty years. I had never played an active role in learning if the teachers always fed me the answers. It was because I knew that the teachers would give the correct answers, so I just waited for them. I thought this approach made the adult learners become more active." (Elementary student No.13's interview)

In addition, they reported that they were eager to learn because the corpus-based method provided them a specific resource to search, and they knew that the answers were right there in the corpus.

"I was active because the corpus-based method had clear objectives and it provided a specific resource, so I knew that the answers were right there in the corpus." (Lower intermediate student L06's interview)

This was supported by the results from the teacher observations, which also revealed that the students were eager to learn and put a lot of effort into their work. They often discussed the process and their findings with their classmates and teacher. Although the results indicated that the majority of the students became active learners through the corpus-based method, there were several students who still preferred the traditional deductive approach and wanted the teacher to teach them everything because it was easier in the sense that they did not have to think much.

Students' Capability to Raise Questions and Queries

The current corpus-based method encouraged the students to raise questions and queries either about or beyond the lessons. The results from the questionnaires revealed that the students agreed (4.05 points) that they could raise questions and queries regarding the lessons in class. However, they only agreed moderately (3.81 points) that they could raise questions and queries that were beyond the lessons in the class. According to the observations, the questions that the low-proficiency students asked were related to word meaning, word use, and basic grammar such as tenses and voice. Their questions were simple; not critical or complicated. An example of their questions is shown below.

"I don't think "attractive" and "good" can be used in this step because attractive means good looking, especially in a way that makes you sexually interested in somebody, but it can. Why?"(Teacher observation)

Similarly, the results from the journals and interviews revealed that the students were curious about the vocabulary, grammar, language use and structure.

"I was curious about the sentence structure of each move and step. I wanted to know why the sentence structures and uses of words (in each step) had to be like this." (Beginner student No.125's interview)

Students' Capability to Design and Manage Their Own Search

The majority of the students (58.7%) revealed that they could design and manage their own search while learning through the corpus-based method. Based on the interviews and teacher observations of students learning journals, the process applied by the students was as follows: First, students tried to understand the instructions in the activity sheets. Then, they thought of words that needed to be researched. After that, they considered the functions that should be

employed to find the answers. Finally, they searched for the terms from the corpus and observed their uses. Most of them requested a dictionary or a translation program as an additional instrument in the process. Teacher's guidance was requested more in the beginning. However, there was a group of students who were not sure or could not design and manage their own search. The factors that were discussed by the students were their unfamiliarity and the complication of the corpus analysis tool and the limitation of their background knowledge of English. It was observable that students often forgot to delete the −ed, −s and −ing endings, and also forgot to add * at the end of the searched term. Due to this, only a small number of results were evident which in turn prevented them from finding the correct answers. See the capture of corpus screen when searching a term with and without the asterisk (*)

*"I could not find some words because I often forgot to delete some letters and add *"(Elementary student No.98's journal)*

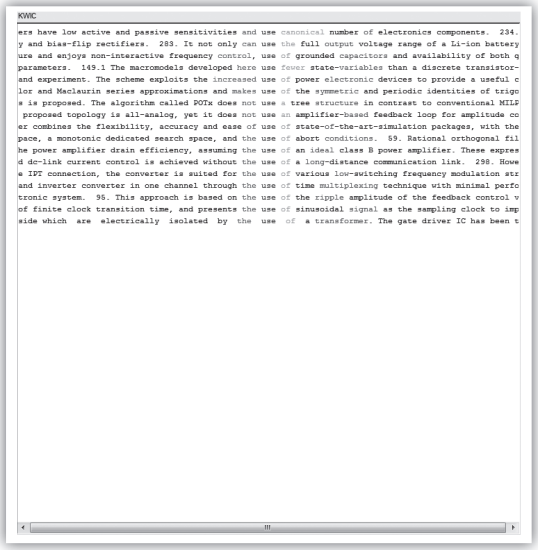


Figure 3: An example of students' search of the term use without asterisk (use)

Figure 4: An example of students' search of the term use with asterisk (use*)

Students' Ability to Discover about Language by Themselves

The results from the questionnaires showed that the majority of the students (67.89%) revealed that they could discover new things about the language by themselves. They could also find the appropriate terms and collocations and identify tenses, voices and patterns that were normally used in each step of each move. Finally, they could check the correctness of the uses of the significant linguistic features in their own writing. Figure 5 shows a capture of concordance lines presented to the students. In addition, they discussed helpful tools in learning collocations.

"I used the corpus to check the words such as verbs and adjectives, something like that. I checked how they were used and what words came before and after them. I normally check how they were used before I wrote. It helped me a lot." (Beginner Student No.125's interview)

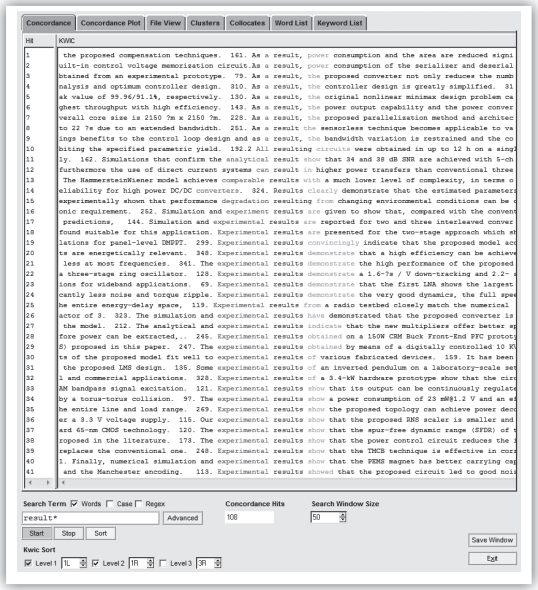


Figure 5: A capture of corpus screen: the data presented in Concordance

According to the interviews and observations, it was revealed that students used different corpus functions to discover different aspects of language. To discover the significant terms in each step of each move, these students consulted the *Word List* function with a dictionary or a translation program as a supplementary resource. To discover the collocations and patterns, students consulted the *Concordance* function with the use of the *Sort* function. To discover tense and voice, students used the *Concordance* and *Sort* functions with a request for supplementary resources such as a summary lesson of tense and voice. To discover patterns, the students also used the *Concordance* and *Sort* functions with a request for a dictionary to check parts of speech. It could be clearly recognized that the students could discover about the language by themselves using the corpus as

a main resource; however, with their limitation of English they often requested other supplementary resources like dictionaries, translation programs or summaries of grammar lessons.

Students' Ability to Hypothesize, Analyze, Summarize and Verify Data

This DDL skill was discussed the most difficult skill for the students since most of them had never hypothesized, analyzed, summarized nor verified data before. According to the questionnaire results, only 34.8% of the students revealed that they could hypothesize about the language. For those who could not do this activity reported that it was because of their limitation of English. The students who could hypothesize language did it before consulting the corpus. They revealed that they predicted the answers based on their background knowledge of English.

"I guessed the synonyms (for the assigned terms) and then I searched the corpus whether they were found in the corpus. I had some background knowledge (of English). I had something in my head." (Beginner student No.61's interview)

However, the questionnaire results revealed that when it came to an analysis, summary and verification of data, more than 50% of the students reported that they could analyze, summarize and verify their findings. To analyze and summarize the data, the students requested a summary of grammar lessons to compare what they found from the corpus with the grammar rules or a dictionary. To use the corpus to verify the data, the students often used it when they did writing tasks. However, a few of them revealed in the interviews that they preferred checking how the linguistics features were used before they wrote them so they did not need to verify the data after they finished their writing.

Students' Ability to Learn by Themselves both Inside and Outside of Classroom

The results from the questionnaires revealed that the students agreed moderately (3.91 points) that the corpus−based method encouraged them to learn more by themselves. The majority of them revealed that they could use the corpus to investigate about the language. However, most of them used the corpus for the purposes of class study rather than for their own interests. See Figure 6 below:

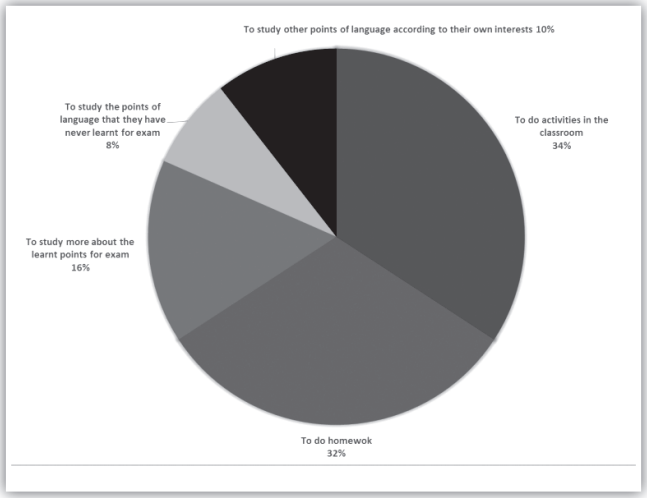


Figure 6: Results from the Questionnaires on Students' Purposes in Using the Corpus

In addition, the students revealed that they normally used the corpus 1−3 days a week. They agreed (4.11 points) that the corpus is an instrument that they will use when they have to write a piece of work in the future.

"I think I should have learned about this program a long time ago because it could be used to write about my (former) project. (Currently) I used the corpus to write a report in English. In the future, I will need to use it to write about my project and some work at my workplace. (Beginner student No.36's journal)

Learners' Attitudes

To answer the third Research Question, the data regarding the students' attitudes were collected using the questionnaires, interviews and students' journals. The results from the questionnaires generally revealed that the students had rather positive attitudes towards the corpus and corpus analysis tools, corpus exercises and the corpus-based method, and that they agreed moderately (3.9 points) that the corpus analysis tool was easy to use. They also agreed at above the middle point of three that the corpus and corpus software helped them recognize the significant terms in each move, select appropriate terms and use the terms correctly. The results from the interviews and student journals agreed with the questionnaire results.

"The benefit of the corpus was that it helped us select the correct terms and form correct sentences in our writing." (Beginner student No.16's journal)

In addition, the students also had relatively positive attitudes towards the corpus exercises. They agreed generally at above the middle point of three that the corpus exercises were interesting and easy. In addition, they agreed at above the middle point of three that the corpus exercises helped them to recognize the significant linguistic features and their uses, and to writing an abstract using of those terms correctly. These were agreeable by the results from the interviews and student journals since the majority of the students reported the usefulness of the corpus exercises. However, several of them reported the difficulties and complications of the exercises since they were more familiar with the closed-question tasks.

"I felt that the corpus-based exercises were difficult. But I could understand them later. I mean, sometimes the instructions were not clear, whether there was only one answer or if there were more possible answers. I would like the teacher to clarify the instructions or give some examples. I was not good at English grammar so I was not sure what the mistake of "recent" in the given sentence was. There should be multiple choices available. Actually, I understood the instructions, but I did not know how to find the answers. However, after I was more familiar with this type of question, I could complete the exercises." (Lower Intermediate student No.06's interview)

Towards the corpus-based method, the students agreed at above a moderate level that the corpus-based method was useful in learning the significant linguistic features and in checking that the terms, tenses, voices and sentences that they wrote were correctly used. Moreover, they agreed that the corpus-based method was useful for them in learning to write an abstract and developing their abstract writing ability. The students also agreed that the corpus-based method encouraged them to play active roles and learn more by themselves. They revealed that they would use it in the future.

"I was active because the corpus-based method made me feel that I wanted to continue studying. It was like my assistant and like a teacher in the form of a computer because it could provide me examples when I did not understand." (Beginner student No.88's interview)

In summary, the results from the pre-posttest revealed that the corpus-based instructional method has positive effects on low-proficiency students. The results from the questionnaires, interviews, student journals and teacher observations also revealed that low-proficiency students could develop their DDL skills. In addition, it was found that students had positive attitudes toward the corpus, corpus analysis tool, corpus exercises and corpus-based method. However,

the learning process that the low−proficiency students learned through the corpus−based method was different from that of the high−proficiency students. The low−proficiency students used the corpus with a requirement of a dictionary and grammar lessons as their supplementary resources. It was recommended that the teacher develop his/her role from a guide to be an assistant. The corpus lessons should start less complicated and then move on to be more complicated. Besides, it was recommended that the corpus exercises start from closed−question tasks and then progress to open−question tasks.

Conclusion

The results from the pre−posttest indicated that the corpus−based method could improve low−proficiency students' performance in recognizing significant linguistic features of the abstracts as well as enable the students to use these features correctly in their abstract writing. Moreover, the results from the questionnaires, interviews, student learning journals and teacher observations revealed that the corpus−based method could support students in developing their Data−Driven Learning skills including playing an active role in class, raising questions and queries about the language, designing and managing their own search, discovering about the language by themselves, hypothesizing, analyzing, summarizing and verifying the data, and learning by themselves both inside and outside of classroom. The students also had positive attitudes toward the corpus−based method including the corpus−based instruments. However, their limitation of background knowledge of English was a significant factor that caused the students some difficulties in learning through the corpus−based method. Therefore, students had to try hard to achieve their goals and devoted themselves to practice. For those who did not do so, the outcomes were not satisfactory. Besides, with their limitations in English, the low−proficiency students should be allowed to use supplementary resources such as a dictionary and a summary lesson

of grammar to help them benefit from the corpus. It could be noted further that the low–proficiency students could learn and benefit from the corpus as well as they could from the DDL approach; however, the model or method of teaching needs to be adjusted since the original DDL principles could not work effectively with them. Further study should be conducted to propose an instructional model for an implementation of the DDL approach for low–proficiency students in learning specific writing skills as well as other skills of English.

Bio–data

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