

Exploring EFL learners' lexical application in AWE-based writing

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Abstract. With massive utilization of Automated Writing Evaluation (AWE) tools, it is feasible to detect English as a Foreign Language (EFL) learners' lexical application so as to improve their writing quality. This study aims to explore Chinese EFL learners' lexical application to see if AWE-based writing can bring about positive effects of lexicon on linguistics features, especially in word count, word frequency and word density in their writing texts across a series of tracked revisions in University English classrooms and beyond. The findings from both classroom observations and learners' responses to a post-test questionnaire survey reveal that they showed very positive perceptions of AWE-based writing in which they were greatly encouraged to make modifications in each writing task. It shows from data analysis of the writing texts that learners tended to replace simple lexical terms with more academic and concrete ones in revisions. The results signify implications for EFL learning of lexicon and writing, and also for AWE developers. However, it implies from the analytic features of lexicon that learners' lexical modification was limited. This perhaps suggests for further research on learners' lexical modification in AWE-based writing context to see if there is any difference across genders and different levels of achievers.

Keywords: AWE, lexical application, modification, *Pigai* system.

1. Introduction

Learners' writing proficiency partly depends on their lexical ability in terms of writing improvement, as writing consists of 'grammaticalized lexis' (Lewis, 1993). Lexicon, not merely a list of words, is conceived as "a set of lexical resources, including the morphemes of the language, plus the processes available in the

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language for constructing words from those resources” (Trask, 1999, p. 111). In this study, lexical application ability refers to learners’ effective use of lexical items, including words and phrases, frequent collocations, institutionalized utterances, sentence frames and heads (Lewis, 1993). Previous research has proved a positive relationship of lexicon on language learners’ writing quality in terms of word range, word diversity, word frequency, and polysemy (Engber, 1995; Hu, 2015; Qin & Wen, 2007; Laufer & Nation, 1995).

Recently, massive application of AWE tools has been expanded to language teaching and learning purposes, which has provided great potential possibilities for EFL learners to proceed with their writing tasks at their own rate with real-time feedback. Much research is reportedly promising and positive, where the utilization of AWE tools can be realized in terms of time efficiency, reduction of teachers’ workloads, increased learner autonomy (Sherimis & Burstein, 2013) and improved writing skills (Scharber & Dexter, 2008). This study aims to explore EFL learners’ lexical application to see if AWE-based writing has positive effects of lexicon on linguistic features based on their writing tasks on a web-based AWE tool, the *Pigai* system (<http://www.pigai.org>), which makes it accessible to keep precise track of any step in the creation of writing with real-time feedback in terms of vocabulary use, grammar, cohesion, and content relevancy.

2. Method

2.1. Research questions

This study is driven by the following questions:

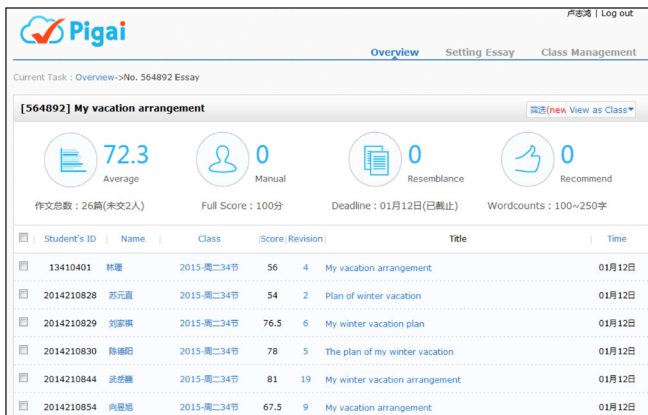
- Is the AWE tool, the *Pigai* system, helpful for students to improve their writing skills, especially in terms of lexical application?
- If yes, to what extent does the AWE-based writing affect students’ lexical application? If not, what are the causes?

2.2. Teaching and research design

The study was carried out in one-week intervals from September 2015 to January 2016 and it involves 26 second year non-English majors in Beijing University of Posts and Telecommunications’ English Audio-Video Speaking

Course (EAVSC), with a pre- and post-test design coupled with follow-up questionnaires in a digital lab. All of the students had passed CET-4³ before taking the course but were still required to take a test of the same format of content-based integrated listening-speaking tasks through a self-developed web-based English language skills training system at the beginning and the end of the semester. During the whole semester, classes were conducted using the following pattern: students began every class by watching a video clip; next, engaged in synchronous computer-mediated group and pair discussions on the given topics; then proceeded with a ten minute online writing task on the same topic using the *Pigai* system; finally, performed a one minute recorded personal statement task on the same topic. The AWE-based ten minute writing task in class with an assigned topic each week served as an embedded task on a regular basis and students were allowed to revise their writing after class before a deadline set by the instructor.

Figure 1. A screenshot of students' writing submissions on the *Pigai* system



2.3. Data collection

The questionnaires and interviews following pre- and post-tests were conducted and collected through the adopted system, which would provide insights into students' perceptions of the *Pigai* system, particularly their feedback in terms of vocabulary, grammar, content and cohesion. All of the students submitted their pre-test questionnaire, but one missed the post-test questionnaire. All the students' writing texts were collected and each modification or reconstruction was tracked through the *Pigai* system.

3. CET is the abbreviated form of 'College English Test'. The national College English Test Band Four—CET-4 in China aims to evaluate non-English majors' comprehensive language proficiency. Apart from CET-4, there is also CET-6, which is widely used to evaluate above-average college students' English language proficiency.

2.4. Data analysis

There were 11 writing tasks during the whole semester which covered a variety of social issue topics, including job hunting, the relationship between tourism development and environmental protection, e-games, etc.

In order to explore the students' lexical application and the effectiveness of lexical modification in AWE-based writing, the multiple writing scores and lexical features of the three writing tasks (the first, sixth, and final ones) were selected as the research samples in the current study. The scores data were processed using SPSS 22.0 to see if there is a significant difference in the first and final draft in each of the three writing tasks.

To investigate students' lexical application across multiple drafts and their lexical modification in AWE-based writing, the Coh-matrix tool (Graesser, McNamara, Louwerse, & Cai, 2004) was employed as a complementary tool for analytic features on texts.

The web-based Coh-matrix, developed by the University of Memphis, automates over 200 measures of language, discourse and cohesion through extracting information from texts. Change in lexicon use can be seen from the measured scores of texts calculated with Coh-matrix, including word count, word length, word frequency, and lexical richness across multiple writing results.

3. Results and discussion

3.1. Analysis of AWE-based writing scores

The average number of revision times of the 11 writing tasks is 5.12 to 13.42 (in the seventh task). Although it drops to 6.81 in the final task after 12.69 for the tenth task (probably because it was close to the final exam session), as shown in Table 1, students in the mid and final writing tasks still conducted more revisions than they did in the first task.

The results of the students' writing scores basically fit the normal distribution and paired sample *t*-tests revealed a significant difference in scores between the first and the final drafts for all of the three writing tasks in the study (*t*_{first task} = -6.06, *p* < 0.05; *t*_{sixth task} = -5.50, *p* < 0.05; *t*_{final task} = -7.34, *p* < 0.05).

Table 1. Paired sample *t*-test of scores for students' drafts

	N	Average times of revision drafts	Mean Scores					
			First draft		Final draft		MD	t
			M	SD	M	SD		
First writing task	26	5.12	70.06	9.78	75.90	8.11	-5.84	-6.06*
Sixth writing task	26	7.31	69.04	12.74	78.50	8.22	-9.46	-5.50*
Final writing task	26	6.81	63.83	7.28	72.25	7.45	-8.42	-7.34*

Analytic features of students' perceptions

With respect to how students perceive the *Pigai* system in affecting their writing quality, from the questionnaire feedback, 84% students considered that for each revision they valued the score provided by the system, and only 20% of them thought they would cease modification if they get a lower score after their modification. 68% of them showed gratitude to the real-time and multiple comments which helped them realize their weaknesses and pushed them to rewrite or revise.

3.2. Analytic features of lexicon

As is shown in Table 2, the paired sample *t*-test results revealed that there was no significant difference between the first and the final draft both in average word count ($t=-1.89, p>0.05$) and word frequency ($t=0.67, p>0.05$). The word frequency count was based on CELEX, the database from the Dutch Centre for Lexical Information (Baayen, Piepenbrock, & Gulikers, 1995). For the average word length, students chose longer words in their final drafts than those in their first drafts ($t= -4.44, p<0.05$), indicating that they possibly used more academic or formal words in the process of revision.

Table 2. Analytic features of the final writing task

Linguistic features	N	Drafts for the final writing task			
		First draft	Final draft	MD	t
Average word count	26	138.80	159.35	-20.54	-1.89
Average word length	26	4.14	4.26	-0.12	-4.44*
Word frequency	26	3.08	3.07	0.01	0.67
Type-token ratio	26	0.62	0.60	0.02	1.49
Connective incidence	26	103.63	1.09.39	-5.75	0.013*

Note: * $p<0.05$

Type-token ratio is very important to measure the lexicon richness, for a low ratio usually indicates that words are repeated many times. Table 2 shows that type-token ratios of the first and the final draft had no significant difference ($t=1.49$, $p>0.05$). However, the results revealed a significant difference in connective incidence ($t=0.013$, $p<0.05$). The higher the incidence of connectives, the more it is assumed that students applied connective words and phrases in their final drafts.

4. Conclusions

The findings from the research showed that students appreciated and valued the real-time feedback provided by the *Pigai* system and they were highly motivated and encouraged to make modifications for each writing task. They tended to replace simple lexical items with more academic and concrete ones. Nevertheless, the analytic features of lexicon implied that their writing improvement was limited, and this perhaps requires for a further study on textual analysis in depth so as to better explore their modification tracked by the *Pigai* system to see if there is any difference across genders and among different English levels of students.

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