Enhancing EFL College Students' Language Performance via eBook Supported Learning

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Abstract: This study aims to analyze which particular learning behaviors with eBook supported learning are associated with high-achievers in language learning. This specifically focuses on English output (refers to English writing in this study) performance. Furthermore, to compare learning with and without an eBook, this study observes the correlation between self-regulated English learning (SREL), English self-efficacy (ESE), and learning achievements. This is done as a means to suggest which particular form of learning autonomy awareness should be explicitly addressed to boost language learning outcomes. This semester-long study was conducted with EFL students from the College of Management in a "General English for Specific Purposes" (GESP) course in a four-year comprehensive university in Taiwan. Pre-class reading materials were uploaded to an eBook platform and features of the platform were introduced beforehand to facilitate self-learning prior to class. Through analyzing the students' 1) learning logs on the eBook platform, 2) scores on SREL and ESE questionnaires, and 3) learning achievement, the results revealed that online reading behaviors of adding markers and memos had a significant, positive correlation with students' learning achievements. Meanwhile, the experimental group students outperformed those in the control group in open-ended, short essay style questions in terms of written statement quantity. With regards to SREL, scores in both the control and experimental groups increased throughout the study.

Keywords: Learning analytics, eBook, Self-regulated English learning, English self-efficacy, Language output

1. Introduction

The acquisition of a foreign language consists of language perception and language production. Language perception can be assessed through comprehension questions, and language production can also be assessed by various rubrics to determine the level of capacity. Evaluations of language perception and production are a standard practice used to ensure that the desired effectiveness of language teaching is met. Notably, the process before achieving language perception is often neglected. How second language learners process language input is an essential area of study, which can assist instructors in intervening at an early stage to offer the necessary help at the right time (LaBrozzi, 2016). Processing language input is a personal decoding process that used to be unrecorded when media was paper based. With the advance in technology, eBook supported learning allows instructors to possess a better understanding and influence on learners' learning outside of the classroom (Lai, 2015). Unlike first language reading, second or foreign language reading requires skills in both decoding the language and the content. Whilst reading, second language readers regularly deal with the two sets of skills, simultaneously. Therefore, the significance of this study is to identify positive connections between second language reading behaviors and language performance. Through the adoption of eBook platforms, the connections of the two in question can be revealed partially if not wholly.

eBook reading behaviors can be associated with several learning models from the perspective of self-regulated learning (SRL). According to Zimmerman's (2000) model, students undergo the stages of forethought, performance, and self-reflection, thus acquiring skills through monitoring their use of the platform. In Winne and Hadwin's (1998) model, rooted in the Information Processing Theory (Greene & Azevedo, 2007), students acquire tactics and strategies through their interactions with the

platform. Several eBook reading behaviors have been analyzed as a means to effectively predict students' learning outcomes. Consequently, this allows the implementation of in-time intervention from instructors to facilitate students' learning. For example, Yamada and Goda (2016) discussed the relationship between procrastination in eBook reading and learning performance. By analyzing students' learning logs, instructors are able to focus on the specific behaviors that learners produce, which provide them with evidence-based insights for future classroom activity designs. BookRoll, the eBook platform utilized in this research, can track the following activities: opening a file, closing a file, adding bookmarks, deleting bookmarks, adding a marker, deleting a marker, adding a memo, deleting a memo, changing a memo, clicking the next page, clicking the previous page, jumping a page, and using the search function. The feature known as "Marker" allows learners to highlight important points in red and confusing words or statements in yellow. Moreover, "Memo" enables learners to annotate quick notes, self-reflection points, questions, comments, and the like.

While SRL refers to the ability to self-teach and monitor, self-efficacy (SE) refers to self-evaluation and reflection on learners' ability to complete tasks. Bandura and Schunk (1981) emphasized that there is a strong correlation between students' self-efficacy and actual ability. Studies of Second Language Acquisition have indicated a positive correlation between English self-efficacy (ESE) and learning performance. Finally, as Su et al. (2018) concluded, according to the results of questionnaires on self-regulated English learning (SREL) and ESE, SRL has a strong positive correlation with SE.

Based on the above introduction, this study aims to analyze the relationships among SREL, ESE, eBook supported learning, and language learning achievement. Additional attention will be placed on students' writing fluency as demonstrated through the word counts of short essay writing. Therefore, three research questions are established to evaluate the effectiveness of eBook learning activities for further instruction design in language curricula:

RQ 1. Which eBook supported learning behaviors are positively associated with language learning achievement?

RQ 2. What is the correlation between students' ESE and language learning achievement?

RQ 3. How do SREL and ESE evolve after a semester of study in both the control group and the experimental group?

2. Methodology

2.1 Subject and Course

This study was conducted in a university setting in Taiwan, with 82 sophomore students in two classes undertaking a required semester-long language course in "English for Business Communication." The control group consisted of 43 students, while the experimental group comprised of 39 students. The English proficiency of both groups were similar according to their English scores on the General Scholastic Ability Test taken prior to entering the university. Their average English proficiency was close to CEFR A2 to B1. While undertaking this required course, students were advised to read supplementary reading materials before class. In-class activities included weekly short essay writing assessments, group discussions, and micro-presentations. Short essay writing assessments were used to reflect their understanding of the assigned readings, while also used to demonstrate their critical thinking skills. Grading was weighted more on the content and the flow of expression, rather than the technical aspects of grammar or spelling. Notably, points were not removed due to grammatical or spelling mistakes unless such mistakes hindered the understanding of the essay. In-class group discussions would adopt the same open-ended questions as essay prompts. These were designed to boost students' collaborative critical thinking skills. After discussion, each group would appoint a representative to deliver a micro-presentation. Both the control and experimental groups had an identical course which consisted of pre-reading, short essay writing, group discussion, and micro-presentations to enhance their language skills in different aspects. The differences between the two groups included the following aspects: 1) the control group was given access to downloadable PDF files of reading materials, whereas the experimental group was introduced to BookRoll, an eBook platform. On BookRoll, students' reading behaviors could be tracked by the instructor, 2) in the experimental group, the instructor started each class with a quick review of the platform dashboard, which illustrated an overview of the class' reading status. This was, not only to ensure expectations of material previews

were met, but also to respond directly to questions or confusing concepts students marked or annotated on the platform. At the end of this course, students were evaluated by their weekly assessments scores, mid and post-course learning achievement tests, and group discussions. The learning activities and collected datasets are illustrated in Figure 1.

2.2 Data Collection

Data was collected from both the experimental group and the control group, which includes scores and word counts of the weekly assessments, pre and post-achievement tests, and SREL and ESE questionnaires. During this study, word counts of the weekly essay assessments were used as an indicator of learners' writing fluency. eBook learning logs were also collected for the experimental group.

Zheng et al. (2016) designed the SREL questionnaire regarding self-regulated learning, which focused on English learning. The questionnaire contains six components, referring to self-regulation theories in educational psychology proposed by Barnard et al. (2009) and Zimmerman & Schunk (2011). Along with the SREL questionnaire, Su et al. (2018) designed an ESE questionnaire which was a modification of Wang's et al. (2014). This was designed as a means to assess students' English self-efficacy in four skills: listening, speaking, reading, and writing.
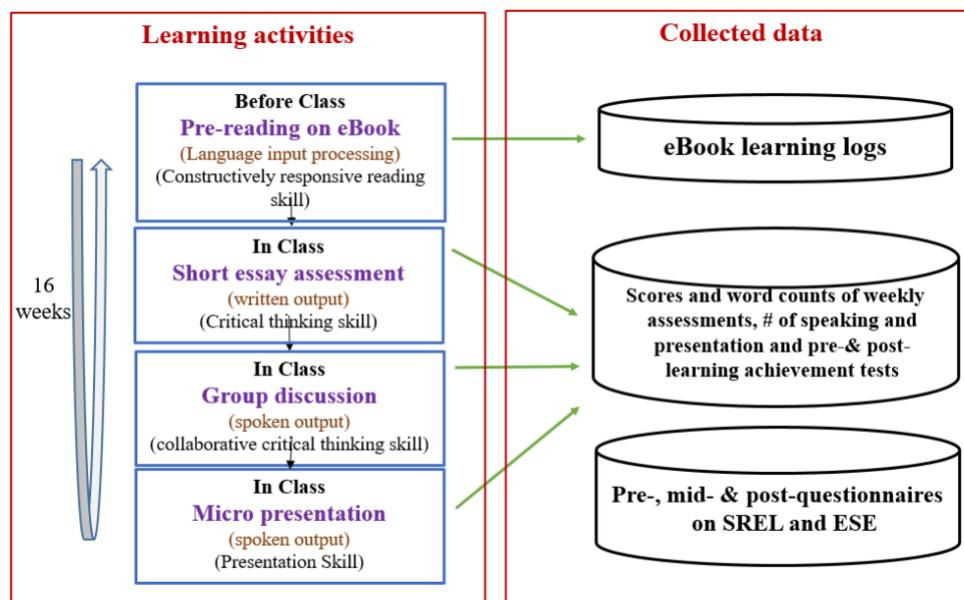

Figure 1. Learning activities and collected data from the experimental group and control group.

3. Results

3.1 Correlation between eBook Learning Behaviors and Academic Performance

According to the Spearman correlation analysis, we found that online reading behaviors that used the functions "add marker," "delete marker," and "add memo" on the eBook platform have a strong positive correlation with the students' learning achievement within the experimental group. Students used the marker function to highlight important points or unclear statements and added memos on the side of reading passages to note down translations of keywords or to raise questions. Table 1 shows that the features of "add marker" and "add memo" on eBook platforms may help students "consciously register" input and then transfer the input to be intake.

Table 1
Correlation between eBook Learning Behaviors and Academic Performance

	Feature	4-1 score	4-2 Score	5-1 score	5-2 score	U6 score	Final total	Final A	Final B	Course score
eBook file	Open	0.346*	0.199	0.505**	0.251	0.572***	0.510**	0.443**	0.516**	0.542**
	Close	0.222	0.204	0.230	0.134	0.368*	0.328*	0.239	0.414*	0.437**
Bookmark	Add Bookmark	0.349*	0.157	0.125	-0.147	0.232	0.255	0.252	0.199	0.226
	Delete Bookmark	0.365*	0.130	0.160	-0.102	0.204	0.262	0.280	0.200	0.244
Marker	Add Marker	0.465**	0.345*	0.245	0.226	0.285	0.612***	0.642***	0.350*	0.379*
	Delete Marker	0.386*	0.121	0.259	0.243	0.180	0.456**	0.444**	0.325*	0.377*
	Marker	0.478**	0.342*	0.261	0.234	0.288	0.622***	0.664***	0.350*	0.391*
Memo	Add Memo	0.413*	0.269	0.075	0.215	0.171	0.375*	0.434**	0.190	0.403*
	Delete Memo	0.167	0.104	0.160	0.211	0.069	0.170	0.220	0.132	0.193
	Change Memo	0.272	0.203	0.024	0.216	0.136	0.285	0.326*	0.175	0.247
	Memo	0.394*	0.242	0.061	0.218	0.129	0.357*	0.427**	0.171	0.364*
eBook page	Next	0.177	0.300	0.305	0.296	0.450**	0.333*	0.337*	0.245	0.349*
	Prev	0.317	0.029	0.252	0.304	0.418*	0.238	0.243	0.251	0.261
	Jump	0.179	-0.291	-0.133	-0.167	-0.397*	-0.166	-0.200	-0.041	-0.100
	Search	-0.018	0.097	0.090	0.250	0.093	0.236	0.206	0.184	0.108

3.2 Correlation between English Self-Efficacy and Academic Performance: On the Quantity of Written Output

Table 2 shows the t-tests for the control group and experimental group on writing fluency. Students in the experimental group outperformed the control group in terms of the flow of their writing.

Table 2
T-test of Control Group and Experimental Group on Writing Fluency/ Word Count

	Control group		Experimental group		t-test
	Mean	Std	Mean	Std	
1-1 word count	46.12	33.74	47.62	28.10	0.213
1-2 word count	43.55	28.18	41.89	33.13	-0.240
2-1 word count	22.45	20.59	37.22	33.92	2.369*
2-2 word count	22.19	22.05	29.38	25.36	1.348
3-1 word count	24.26	16.23	34.24	25.7	2.089*
mid word count	37.19	31.83	74.49	56.38	3.675***
4-1 word count	31.38	26.20	36.54	31.09	0.800
4-2 word count	16.31	16.21	29.78	31.56	2.420*

Table 3 indicates that the experimental group's results on the final ESE questionnaire have a stronger correlation with their academic performance, especially in reading, writing, and internet skills. The results also indicate that the correlation between ESE and academic performance continued to intensify over the pre-, mid-, and post-course ESE questionnaires. Students' use of an eBook platform which allows them to "add memo" may have had a positive influence in helping them raise their writing ESE, thereby enhancing the flow of their written output in open-ended essay questions.

Table 3
Correlation between Students' English Self-Efficacy and their Academic Performance (Experimental Group- Post-test)

	Listening	Speaking	Reading	Writing	Internet
Pre-test A (mid)	0.205	0.367*	0.433**	0.490**	0.275
Pre-test B (final)	0.336	0.297	0.477**	0.399*	0.154
1-1 score	0.280	0.211	0.303	0.339*	0.291
1-2 score	0.089	0.184	0.277	0.210	0.341*
2-1 score	0.383*	0.380*	0.447**	0.284	0.348*
2-2 score	0.214	0.227	0.205	0.167	0.067
3-1 score	0.005	0.069	0.067	0.040	0.247
mid total	0.255	0.356*	0.494**	0.420*	0.487**
mid A (multiple choice)	0.182	0.222	0.397*	0.355*	0.323
mid B (short essay)	0.299	0.423**	0.492**	0.414*	0.523**

4-1 score	-0.014	0.063	0.005	0.105	0.233
4-2 score	0.168	0.120	0.216	0.151	0.151
5-1 score	-0.205	-0.040	0.095	0.183	0.312
5-2 score	-0.005	0.007	0.017	-0.070	0.160
U6 score	0.008	0.121	0.119	0.135	0.331*
Final total	0.079	0.237	0.425**	0.397*	0.458**
final A (multiple choice)	-0.058	0.102	0.280	0.271	0.358*
final B (short essay)	0.252	0.366*	0.472**	0.482**	0.420*
Semester score	0.109	0.221	0.351*	0.276	0.395*

Table 4 shows the correlations between students' ESE post-tests and their academic performance in writing fluency in the experimental group. Students in the control group do not exhibit a distinctive correlation between the two, whereas students in the experimental group show a positive correlation in listening, speaking, reading, and internet skills.

Table 4
Correlation between Students' English Self-efficacy (Post-test) and their Academic Performance in Writing Fluency (Experimental Group)

	Listening	Speaking	Reading	Writing	Internet
1-1 word count	0.282	0.327*	0.290	0.274	0.241
1-2 word count	0.114	0.191	0.256	0.184	0.441**
2-1 word count	0.349*	0.340*	0.423**	0.211	0.377*
2-2 word count	0.126	0.200	0.098	0.135	0.044
3-1 word count	0.125	0.094	0.085	0.077	0.280
mid word count	0.288	0.313	0.367*	0.264	0.445**
4-1 word count	0.059	0.113	0.142	0.169	0.255
4-2 word count	0.158	0.060	0.195	0.072	0.084
5-1 word count	-0.109	-0.032	0.193	0.119	0.289
5-2 word count	0.078	0.066	0.051	-0.071	0.194
U6 word count	0.042	0.108	0.162	0.088	0.327*
final word count	0.275	0.186	0.303	0.196	0.198

3.3 T-tests of SREL and ESE pre- and post-tests

Tables 5 and 6 reveal that SREL scores on "task strategies" and "self-evaluation" increased from the pre-test to the post-test in the control group; whereas the scores on "help-seeking" and " self-evaluation" increased in the experimental group. Both groups improved their scores on "self-evaluation."

Table 5
T-test of SREL and ESE (Control Group's Pre-test and Post-test Scores)

		Pre		Post		t-test of Pre
		Mean	Std	Mean	Std	and Post
SREL	Goal setting	0.71	0.14	0.73	0.16	0.502
	Environment structuring	0.74	0.14	0.77	0.13	1.206
	Task strategies	0.64	0.13	0.71	0.16	2.349*
	Time management	0.66	0.15	0.69	0.17	0.801
	Help seeking	0.68	0.15	0.74	0.16	1.752
	Self-evaluation	0.64	0.13	0.73	0.16	2.632*

Table 6
T-test of SREL and ESE (Experimental Group's Pre-test and Post-test Scores)

		Pre		Post		t-test of Pre And Post
		Mean	Std	Mean	Std	
SREL	Goal setting	0.72	0.12	0.74	0.13	0.807
	Environment structuring	0.73	0.14	0.74	0.14	0.460
	Task strategies	0.63	0.14	0.69	0.15	1.781
	Time management	0.65	0.14	0.71	0.15	1.602
	Help seeking	0.64	0.17	0.73	0.14	2.317*
	Self-evaluation	0.62	0.14	0.69	0.16	2.059*

4. Conclusion and Future Works

eBook platforms possess great potential in elevating the abilities of instructor to proactively monitor students' progress of acquiring language input through reading. The results of the study demonstrate that the eBook functions of "add marker," "delete marker," and "add memo" have a strong positive correlation with academic achievement. This indicates the importance of developing active reading strategies that could empower learners to be more constructive and responsive whilst reading. Future applications in teaching may include the introduction of active reading activities such as paraphrasing, predicting or commenting to increase the productive usage of the "add memo" tool. The study also indicates that the monitoring of reading activities on an eBook platform by the instructor could potentially help students. Such method could assist by transferring reading input to written output more effectively, as more in-time interventions and clarifications are proactively provided for confusing points. Further research could direct attention to spoken output analysis. Moreover, such studies could observe how identical eBook supported learning processes can affect output in the spoken form.

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