Effects of Book Medium Preferences in Extensive Reading on Learners' Reading Volume, Vocabulary Size, and Reading Strategies: A Case Study From a Hybrid Class

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Extensive reading (ER) is an established instructional strategy in English classrooms. While previous studies explored the impact of ER on various learning outcomes, the mediating role of the book medium (paper vs. electronic formats) in the process remains understudied. The present study aimed to bridge this gap by examining the differences in Japanese university students' reading volume, increase in vocabulary size, and reading strategies in a semester-long ER program in a hybrid English course. Fifty-eight students from two English classes were classified into three groups based on their book medium preferences: those who read paper books only (PBO; *n* = 32), those who used electronic books (e-books) for more than half of their reading (EB>H; *n* = 6), and those who used e-books for less than half of their reading (EB<H; *n* = 20). The results indicated that book medium preferences did not significantly impact the reading volume and vocabulary size. However, PBO students were more likely to find a book interesting than those in the EB>H group, and students in the EB>H group were more likely to consult a dictionary if they encountered unknown words than those in the PBO group. The practical implications of these findings are discussed along with potential areas for further investigation.

多読（ER）は、英語の教室で確立された指導戦略である。従来の研究では、ERがさまざまな学習成果に及ぼす影響は調査されているが、その過程における書籍媒体（紙媒体か電子媒体）の介在的な役割については、依然として研究が不足している。本稿は、学生数58人を本の媒体の好みにより3グループに分けた1セメスターの多読指導において、紙の本のみで多読を行った学習者（PBO群：n = 32）と、電子図書を全読語数の50%以上利用した学習者（EB>H群：n = 6）、電子図書を全読語数の50%未満利用した学習者（EB<H群：n = 20）の間で、読語数や読冊数、受容語彙サイズの上昇値、英語の読み方に違いが生じたかを調査した事例研究である。本研究の結果、学習者の本の媒体の好みは、1セメスター間の読語数や読冊数、語彙サイズの上昇値に有意な差はもたらさなかった。しかし、PBO群の学習者は、EB>H群の学習者よりも面白い本と出会えたと回答した割合が有意に高く、また、EB>H群の学習者は、PBO群の学習者よりも未知語に出会った時に辞書で調べる傾向が有意に高いことが示された。これらの結果の実用的な意味と、さらなる研究の可能性を議論する。

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To prevent the spread of COVID-19 at the author's university in 2021, a hybrid class format was adopted. This format was a combination of face-to-face and remote modes of instruction. In English classes that used this format, teachers brought computers to their classrooms, and connected the computers to Zoom, an online video conferencing tool. Some students attended these classes in person, and some through Zoom. Within the framework of an extensive reading (ER) program implemented in a hybrid English classroom setting, students were presented with two options for obtaining reading materials: paper books borrowed from the university library or electronic books (e-books) accessed through Maruzen eBook Library (MeL), an e-book distribution service developed and operated by Maruzen-Yushodo for academic and research institutions. To ensure accessibility for both in-person and remote students, the former group was advised to read paper books, whereas the latter was recommended to use e-books. However, students were allowed to use their preferred book medium regardless of their mode of participation.

A substantial portion of previous ER studies utilized print medium as their mode of reading (Fujii, 2020; Fujita & Noro, 2009; Powell, 2005). With the latest advances in technology and more readers switching to electronic reading sources, more studies have explored the use of e-books (Bui & Macalister, 2021; Chen et al., 2013), although this area of research has received significantly less attention compared to studies on paper books. There is a dearth of studies focusing on the impact of a hybrid ER program in which learners have the option to choose between print or electronic materials as their preferred reading medium. To address this gap in the research, this study aimed to examine the influence of each learner's preferred book medium on their reading volume, vocabulary size gains, and reading strategies within the context of a hybrid ER program in an English course.

Literature Review

The practice of ER involves individual silent reading of a large quantity of books that are at an appropriate level for each learner (Nation & Waring, 2019). This approach to reading has been widely adopted in educational institutions in Japan, and its benefits have been both theoretically and empirically established in the literature. Krashen (1985) postulated the significance of obtaining a large volume of comprehensible input through reading. Empirical studies have substantiated the effectiveness of ER in improving reading fluency (Fujita & Noro, 2009), fostering positive reading attitudes (Powell, 2005; Takase, 2010), and increasing vocabulary size (Chen et al., 2013; Day et al., 1991; Webb, 2007).

Research about the impact of ER on incidental vocabulary learning has shed light on various factors that contribute to the process, including frequency of exposure (Waring & Nation, 2004), contextual information (Webb, 2008), and reading strategies used to make sense of unfamiliar words, such as dictionary use (Nation & Waring, 2019) or selective attention to unknown words (Fujii, 2020). The choice of book medium should also be considered as a critical contributor to the learning process because the medium has the potential to influence reading strategies, which, in turn, may impact learners' reading volume and vocabulary acquisition. Mangen et al. (2013) found that print readers outperformed digital readers in terms of comprehension, and Hamdi (2015) demonstrated that electronic dictionaries were associated with increased frequency of word look-ups. These findings highlight the importance of examining the impact of book medium on reading volume and vocabulary acquisition in ER programs, as increased comprehension may lead to greater reading volume (Takase, 2010), and the use of ER dictionaries may improve vocabulary (Hulstijn et al., 1996). To comprehensively investigate the use of reading strategies by e-book readers, it is crucial to consider the functional attributes of e-book platforms, as they may substantially influence reader engagement and performance.

Previous studies on the impact of online materials on reading process and outcomes have been limited in scope, primarily examining only a select number of platforms such as specific websites (Bui & Macalister, 2021; Chen et al., 2013; Peterson, 2022), and the Xreading platform (Yamada, 2020). Despite the widespread use of the MeL in Japanese universities for electronic resource access, there has been a scarcity of research exploring the effects of utilizing this platform. Furthermore, prior studies have primarily focused on either paper or e-book formats and did not analyze the role of book medium preferences, with the exception of Peterson (2022) and Yamada (2020). Peterson investigated the effects of hybrid ER in Japanese on reading rate development by allowing learners to choose between print books and e-books accessed through a created database. Yamada employed Xreading to address limited student engagement with ER outside of class, offering students the choice of reading books in print or electronic formats. However, neither study explored the ratio of print book to electronic book usage and the potential impact of varying medium preferences.

The present study aimed to address these research gaps by investigating the relationship between each learner's preferred book medium in a hybrid English class and their reading volume, vocabulary acquisition, and reading strategies, with a focus on the MeL platform.

Method

Research Questions

This study explored the impact of different modes of ER in a semester-long ER program conducted in a hybrid English course at a Japanese university. Specifically, it examined learners' reading volume, vocabulary size, and reading strategies in relation to their use of either a print or digital book medium. This study was guided by three research questions (RQs):

RQ1. Did the preferred ER medium impact the number of words, books, and book types learners read?

It was hypothesized that students who read paper books would read more words, books, and book types. This hypothesis was grounded in the study by Mangen et al. (2013), which suggested that paper of might facilitate a deeper understanding of the text, thereby leading to a greater likelihood of continued reading.

RQ2. Did the preferred ER medium impact learners' reading strategies?

It was hypothesized that students who read e-books use a dictionary to look up unknown words more frequently, as indicated by Hamdi (2015).

RQ3. Did the preferred ER medium have an impact on the learners' vocabulary size?

It was hypothesized that students who read e-books would have greater increases in their vocabulary size. This was premised on the assumption that if e-book readers use dictionaries more frequently, as hypothesized in RQ2, it would positively impact their vocabulary learning, as suggested by Hulstijn et al. (1996).

Participants

In total, 58 Japanese English as a Foreign Language (EFL) learners from two English course sections participated in this study, all of whom were third- and fourth-year undergraduate students majoring in engineering at a national university in Japan. Only those students who participated in pre- and post-assessments of vocabulary size were eligible for inclusion in the study. Prior to the start of this study, students took the English Language Proficiency Assessment (ELPA) proficiency test. The results of this test indicated that the proficiency of the participants ranged from a Common European Framework of Reference for Language (CEFR) A1 to B1 level, and that the average proficiency was at the A2 level.

Procedures and Materials

The ER program was conducted in English classes for one semester from April to July 2021. In-class ER sessions were conducted 11 times during the semester and lasted between 15 and 20 minutes. The ER sessions comprised approximately one-fifth of the total English classes. The remaining portion of class time was primarily dedicated to intensive reading utilizing a university-level English textbook, which included a range of activities designed to reinforce vocabulary, knowledge, and grammar skills. Although ER was not assigned as homework, participants were encouraged to read autonomously outside of the class. The class was taught using a hybrid format, with approximately half of the participants attending in-person and the other half attending on Zoom.

Guidance on methods for engaging in ER and its expected benefits was provided before the start of the ER program. Participants were encouraged to start with easy books that suited their interests which did not require frequent dictionary use. However, they could look up unknown words in a dictionary as long as doing so did not negatively affect their reading time and volume.

Three types of books were available to the students. The first type was Graded Readers (GRs), books written specifically for EFL learners. GRs use a limited range of vocabulary and are designed to facilitate better comprehension. The second type was Leveled Readers (LRs), originally written to guide English-speaking children to increasingly difficult and complex texts through varying levels of syntactic structures and types of vocabulary. The third type was Children's Books (CBs), designed for English-speaking children, which include picture and chapter books as well as literature for young adults (Takase, 2010). Books and series that presumably suited the participants' tastes and levels were occasionally introduced during the semester to maintain their interest in ER.

Students who attended class in person were instructed to borrow several books from the university library, which holds more than 4,000 ER titles. Those attending classes via Zoom could read e-books on the MeL platform online. The MeL interface design offers basic functions such as book navigation through the table of contents and changing text size. However, it is not optimized for ER purposes, as it lacks essential features such as a built-in dictionary, text-to-speech, highlighting and note-taking (Figure 1).

Figure 1

MeL's Interface

The following books were available on the MeL at the time of this study: 99 titles of *Macmillan Readers*, 42 titles of *Foundations Reading Library*, 50 titles of *Cengage Page Turners*, 25 titles of *Cambridge Discovery Readers*, and 16 titles of *Building Blocks of Math & Physical Science*. All the series are GR, except *Building Blocks of Math & Physical Science* which is CB. Although the number of e-books available on the MeL was limited compared to other online ER platforms (e.g., Xreading), it was chosen based on zero renewal costs once e-books were purchased and the variety of subject areas available to readers.

Instruments

Participants were instructed to maintain reading logs with the title and *Yomiyasusa Level* (YL) referring to the readability level for Japanese learners of English on a 100-point scale (YL 0.0 to 10.0, with 0.0 being the highest readability) (Takase, 2010). These logs included word count, series, and book

medium (i.e., paper or electronic) when the participants finished reading a book.

The Mochizuki test (Mochizuki, 1998) was used to gauge the difference in vocabulary size among participants. The test was developed for Japanese learners of English. It comprises seven levels ranging from 1,000 to 7,000 words. Test-takers choose English words corresponding to 26 Japanese words for each level. It is suitable for beginners because they are asked to select words that correspond to Japanese translations and definitions, unlike the format wherein the definitions are provided in English. There are three versions of the test, all with identical levels of difficulty. In this study, two versions of the Mochizuki test were used to assess a vocabulary size of up to 6,000 words, based on the assumption of the participants' proficiency level.

At the beginning of the ER program in April 2021, the Mochizuki test VST11 (Vocabulary Size Test, 1,000-word level, version 1) to VST61 (6,000-word level, version 1) was administered as a pre-test (Test 1). A different version, VST 12 (1,000-word level, version 2) to VST 62 (6,000-word level, version 2), was administered as a post-test at the end of the ER program in July 2021 (Test 2). To avoid the inaccurate measurement of vocabulary size due to correct answers being selected by chance, participants were instructed to leave a blank response if they had not encountered the word before. They were further informed that the test results would not count toward their grade, but that they should diligently observe their progress.

After Test 2, a revised version of a questionnaire from Fujii (2020) was administered. It is comprised of 22 questions that address reading strategies related to vocabulary acquisition and English learning motivation for the purpose of investigating potential factors that may influence these strategies. Participants responded to the questions (written in Japanese) on a five-point Likert scale with 5 = *strongly agree* and 1 = *strongly disagree* (see Table 4 for the questions). The research purpose was explained to the participants, and verbal consent was obtained from all of them.

Analysis

Among the 58 participants, 32 used only paper books and 26 used at least one e-book. Among the 26 who used at least one e-book, the amount of reading done on e-books ranged widely, from 4 to 100 percent. To investigate the differences in outcomes based on book medium preferences, the participants were classified into three groups: (1) the paper book only group (PBO), comprising 32 participants who exclusively used paper books; (2) the high e-book use group (EB>H), consisting of six participants who used e-books for more than 50% of the total words read, with an average utilization rate of 89.7%; and (3) the low e-book use group (EB<H), comprising 20 participants who used e-books for less than 50% of the total words read, with an average utilization rate of 16.9%. The study avoided classifying participants into two distinct groups, i.e., paper-only versus mixed/electronic or mixed/paper versus electronic-only, due to the considerable variability observed in the ratio of e-books to paper books among participants who used at least one e-book (4 to 100%). Additionally, only one participant solely relied on e-books, rendering it unfeasible to categorize participants into only two separate groups.

For RQ1 and RQ3, the inter-group difference in the number of words and books learners read for each of the three book types, as well as the difference in the Mochizuki test results, were measured using a one-way analysis of variance (ANOVA). For RQ2, questionnaire results were analyzed using the Kruskal-Wallis test. Mann-Whitney tests were performed for multiple comparisons, with Bonferroni's adjustment for the level of significance. The significance level chosen for this study was set at $p < .05$.

Results and Discussion

RQ1: The impact of book medium preference on the number of words, books, and book types read

Tables 1 and 2 present the results of a one-way ANOVA analysis of the number of words and books that the participants in each group read during the semester, including the breakdown of the three book types (GR, LR, CB).

Contrary to our hypothesis, the ANOVA results indicated that there were no statistically significant differences among the three groups with respect to the total number of words or the total number of books learners read for each of the three book types. Although the present study did not investigate the relationship between printed books and enhanced reading comprehension, the results suggest that both paper and electronic books were comparable in terms of participants' volume of reading in the context of this hybrid ER program.

RQ2: The impact of book medium preference on reading strategies

Table 3 presents the questionnaire results. The questions were in Japanese and translated into English by this manuscript's author.

Table 1

Number of Words Read

	Total	GR	LR	CB	*Max*	*Min*
	M (SD)					
EB>H	32,736	30,919	1,008	809	53,042	7,150
(*n* = 6)	(22,247)	(22,279)	(1,981)	(1,982)		
EB<H	36,451	23,363	8,274	4,963	61,299	5,455
(*n* = 20)	(18,601)	(19,938)	(8,915)	(11,880)		
PBO	33,703	21,970	8,281	3,330	101,500	3,089
(*n* = 32)	(22,359)	(20,296)	(12,698)	(10,455)		
F	0.13	0.48	1.22	0.39		
p	.88	.62	.30	.68		
η^2	.01	.02	.05	.02		

Table 2

Number of Books Read

	Total	GR	LR	CB	*Max*	*Min*
	M (SD)					
EB>H	15.2	11.3	2.5	1.3	22	9
(*n* = 6)	(5.4)	(5.9)	(4.3)	(3.3)		
EB<H	24.6	12.8	9.6	2.3	42	8
(*n* = 20)	(8.8)	(9.9)	(8.9)	(4.8)		
PBO	19.6	9.9	8.6	1.1	43	2
(*n* = 32)	(10.5)	(7.8)	(10.9)	(3.2)		
F	2.85	0.67	1.24	0.53		
p	.07	.51	.30	.59		
η^2	.10	.03	.05	.02		

Two question items (#3 and #16) showed significant differences among the three groups, indicating that the PBO group was more likely to find books interesting to them than the EB>H group, and that the EB>H group was more likely to consult a dictionary when encountering unknown words than PBO students.

A potential explanation for the result for item #3 may be the different number of titles available in print and electronic formats. The university library had more than 4,000 paper books, whereas MeL had approximately 230 e-books, most of which are also available in the library in print. This difference might have affected the probability of encountering books interesting to students, as indicated by the higher ratio of e-book usage leading to lower probability of finding an interesting book ([EB>H] < [EB<H] < [PBO]). This difference suggests that a rich ER environment that gives access to varied books should be provided, in line with the argument made by Takase (2010). Books that participants find interesting play a key role in leading learners to long-term autonomous ER, since readers select books based on their level and interests. Another potential explanation of this difference might be the mode of participation in the ER program: Most students who chose to read paper books participated in in-person classes where they saw their classmates with many books and sometimes exchanged information about books that they found intriguing.

The result for item #16 supported our hypothesis: Students who read more e-books than paper books search for unfamiliar words in a dictionary more frequently. This may be because EB>H students

Table 3

Questionnaire Results (5 = strongly agree; 1 = strongly disagree)

#	Question items	EB>H	EB<H	PBO	*H*	*p*
			M			
1	I like English.	2.67	2.55	2.88	1.18	.55
2	I want to improve my English.	4.33	4.35	4.28	0.48	.79
3	I encountered an interesting book.	3.17	3.40	3.97	7.68	.02* [PBO] > [EB>H]
4	I enjoyed ER.	3.80	3.80	4.09	1.57	.46
5	I think ER is a good way for me to learn English.	3.50	3.55	3.75	0.73	.70
6	I found a series that I liked.	3.50	3.55	3.78	1.47	.48
7	I read books that I could read fluently.	4.17	3.65	3.97	2.54	.28
8	I read books for content and meaning, rather than grammar and syntax.	3.67	3.90	3.81	0.49	.78
9	I read books in a specific series.	4.17	3.85	4.06	0.91	.64
10	I read books with specific readability (YL).	3.67	3.50	3.41	0.59	.75
11	I read books wherein I could understand more than 70% of the content.	4.17	4.05	4.28	1.64	.44
12	I was bothered when I encountered unknown words while reading.	4.50	4.40	4.16	2.05	.36
13	I did not feel comfortable skipping unknown words.	3.50	3.50	3.50	0.01	.99
14	I guessed the meaning of unknown words while reading.	4.17	4.00	3.88	0.55	.76
15	After guessing the meaning of unknown words, I checked if my guess was correct.	3.50	3.40	3.44	0.03	.99
16	I looked up the unknown words in a dictionary.	4.33	3.65	3.16	4.22	.04* [EB>H] > [PBO]
17	I tried to remember the words encountered while reading the book.	3.67	3.25	3.41	0.86	.65
18	I found interesting words or expressions in the book.	4.17	3.60	3.97	2.56	.28
19	I encountered many unknown words through ER.	4.50	4.05	4.09	1.81	.41
20	I made a list of words I wanted to remember in ER.	2.00	2.10	1.97	0.45	.80
21	I learned new usages of words that I already knew.	4.17	4.05	3.72	2.65	.27
22	I learned new vocabulary through ER.	4.50	4.15	3.94	3.70	.16

* $p < .05$

had easier access to a web dictionary when reading e-books. While our study did not examine the mode of dictionary usage, it is likely that students who utilized e-books relied heavily on online dictionaries, given that the MeL platform lacked an integrated dictionary function. The use of online dictionaries might have made the process of searching for unfamiliar words easier and more efficient. Conversely, PBO students would be required to temporarily interrupt their reading process to access either an online or paper dictionary for word clarification. This difference in accessibility may have led to the different frequencies of dictionary use. On average, more students agreed that they used a dictionary while reading in the EB>H group (mean = 4.33) than in the EB<H group (mean = 3.65).

RQ3: The impact of book medium preference on vocabulary size gains

The Mochizuki test revealed no statistically significant difference in vocabulary gain among the three groups (Table 4). Vocabulary size at the beginning and end of the ER program was not significantly different either. This finding contradicts our hypothesis that students who read predominantly e-books will show greater gains in vocabulary size. This may be due to the insufficient reading time and volume (approximately 35,000 words in a semester) in the ER program, which were below the recommended standards for ER programs in prior research (Nation & Waring, 2019; Takase, 2010).

Conclusion

The present study investigated the role of book medium preferences on reading volume, vocabulary size, and reading strategies in a hybrid ER program at a Japanese university. The results suggest that reading volume, book selection tendencies, and vocabulary gains did not differ significantly in the semester-long ER program based on students' book medium preferences. Learners were less likely to encounter books they found interesting in an online ER environment with a limited number of titles. Also, reading e-books increased the likelihood of readers looking up unknown words in a dictionary.

Pedagogically, these results confirm the importance of providing students with a wide variety of reading choices in ER programs. In situations where choice is limited (as was in case of the MeL platform), incorporating activities to share interesting books among students may help broaden the range of book selection and increase the likelihood of students discovering books that align with their reading level and taste. The lack of impact of book medium preferences on important outcomes such as vocabulary gains, reading volume, and reading strategies (apart from the use of dictionary) implies that using e-books in ER programs might be a viable alternative when paper books are not available.

The results of the present study should be considered in light of its limitations. First, improvements in vocabulary size must not be attributed purely to ER, since it is impossible to specify to what degree ER contributed to it in a semester-long ER program—especially because intensive reading instruction was part of the curriculum. It is possible that educational factors other than ER affected vocabulary gains to a certain extent. Second, the study was limited to a single platform (MeL) for accessing e-books. Further studies exploring other ER platforms are required to determine whether the results of this study can be generalized. Third, the study did not examine students' actual reading practices, including the mode of dictionary usage. Fourth, the program duration and reading volume may have been inadequate to permit meaningful differentiation between students with varying preferences for

Table 4

Mochizuki Test Results

	Test 1	Test 2	Gain
		M (SD)	
EB>H (n = 6)	3,301.3 (591.6)	3,871.8 (478.3)	570.5 (249.8)
EB<H (n = 20)	3,134.6 (557.4)	3,619.2 (552.0)	484.6 (364.3)
PBO (n = 32)	3,352.2 (652.0)	3,682.7 (688.3)	330.5 (473.2)
F	0.78	0.37	1.32
p	.47	.69	.28
η^2	.03	.01	.05

different book media. Further examination of these variables is necessary to enhance the implementation of hybrid ER programs in the future.

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