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THE MOTIVATIONAL EFFECTS FACILITATED BY ESP DIGITAL MATERIALS INTEGRATED WITH AN E-LEARNING SYSTEM

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ABSTRACT

This study examined how vocabulary materials affected ESP learners' motivation and proficiency. The authors compared three groups of ESP learners by providing them with three types of vocabulary materials on veterinary medicine. The authors selected the vocabulary items from an ESP corpus that they compiled from 180 veterinary medical charts. The participants in three groups studied the same set of ESP vocabulary items from the veterinary medical chart corpus based on; (a) paper-based materials; (b) online e-learning materials using *Quizlet*; and (c) e-learning materials integrated with digital video materials. The participants took a motivational scale test after this treatment. Measuring the results of the pre-and post-vocabulary tests and the motivational factors of the three groups revealed that the learning gains and several motivational factors of both the e-learning users and e-learning with digital materials were significantly higher than those with paper-based ESP materials. These findings highlight the potential of e-learning materials and digital materials developed by an ESP corpus focusing on a specific field.

KEYWORDS
E-learning, corpus, ESP, digital materials

INTRODUCTION

While English for Specific Purposes (ESP) students are expected to learn specific vocabulary items effectively, instructors face difficulties in helping them learn specific vocabulary items due to a lack of student engagement and motivation. With the aim of overcoming obstacles students face, language instructors (e.g., Michael, 2019) introduced a recent trend in digital education for language learning and explored new digital tools combined with educational pedagogy. Some case studies are also observed, in which the effectiveness and efficacy of language learning based on digital materials are substantiated. Regarding the necessity of ESP students' acquiring specific vocabulary items, recent studies have shown the effectiveness of involving ESP corpora by initiating the compilation of corpora for educational and research purposes (Maniez, 2012; Crawford, 2007, Katani, Yoshimi, Nanjo & Isohara, 2016). Despite the growing number of original ESP corpora, a universally accurate, effective method for helping students learn specific, corpus-based vocabulary items has not yet been thoroughly investigated. Thus, this study attempted to explore how we could combine digital materials with ESP vocabulary learning and to examine the effectiveness of digital materials by comparing such digital materials and e-learning suites that include digital materials, e-learning, and audio-visual aids.

LITERATURE REVIEW

Effectiveness of E-learning Materials

Language learning institutions have adopted various computer-aided learning systems, including e-learning. Adopting e-learning instructional components provides more opportunities for cognitive learning, offering students more flexible access to the materials (Petty, Johnston, & Shafer, 2004). Thus, such a learning style has resulted in students' satisfaction with e-learning based on the positive outcomes of student-centered blended learning with computers (Askov, Johnston, Petty, & Young, 2003; Drennan, Kennedy & Pisarski 2005). The trend of combining gameplay elements with an educational domain is widely expanding and beginning to yield successful learning outcomes due mainly to goal-oriented learning (Squire, 2009; Peterson, 2013, Thomas, 2012; Sykes & Reinhardt, 2012; Sykes, 2017), pointing out the potential of peer learning opportunities as benefits. These examples pedagogically suggest the meaningful incorporation of gameplay, e-learning, and digital media.

Among the reports on the effectiveness and potential of computer-based learning materials, the one by Coryel and Chlup (2008) attracts our attention. Their survey, which qualitatively analyzed

the effectiveness of e-learning systems, concluded that teachers should carefully consider four elements before they implement additional materials to allow the students to learn voluntarily with teacher cooperation: (a) Preparation, (b) individualized student-centered instruction, (c) support, and (d) collaboration.

Compiling ESP Corpora

Many researchers have compiled a variety of corpora, especially original ones for ESP (Akano, Hori, & Tono, 2014; Boulton, Thomas, & Jolivet, 2012). Some such ESP corpus studies pointed out a lack of integration between corpus research and teaching applications (Aijmer, 2009; Boulton, Thomas, & Jolivet, 2012). This is one of the issues regarding using corpora in EFL settings.

The empirical analyses through original ESP corpora provide actual discourses that include vocabulary items used in the students' retrospective fields. If we could utilize the actual discourses found in the ESP corpora along with their lexical items for teaching, we would be able to fill the gap in integrating the ESP corpus evidence with more productive teaching and, thereby, produce better learning outcomes. Applying corpus-based materials to educate ESP students by integrating them with digital materials would potentially lead to greater autonomy in studying English.

Considering the remarks of Coxhead (2014) that ESP vocabulary is complex and idiosyncratic, special training to acquire vocabulary will be necessary along with classroom English. As for ESP vocabulary learning procedures, few experimental research studies comparing the self-efficacy between learning through paper-based materials and digital means, including e-learning materials, have been conducted regarding the ESP vocabulary learning procedures.

Aiming to explore an efficacious method to improve ESP students' proficiency and motivation, this study attempts to compare three different vocabulary learning environments: a) Paper-based learning, b) e-learning, and c) digital materials integrated with e-learning.

We started by compiling an original corpus to extract specific vocabulary items students should learn. As a pilot ESP vocabulary study, we selected the field of veterinary medicine. The implementation of this study also addresses issues with applying digital materials to learn specific vocabulary items. The following overview outlines the procedures of this study.

(1) Compiling an ESP original corpus annotated with an XML scheme tag set using veterinary nursing documents, such as medical charts.

(2) Extracting texts using Perl scripts to create an original frequency–based wordlist for vocabulary learning materials.
(3) Creating an environment by integrating e-learning and digital materials with e-learning software for ESP students to learn the wordlist in (2)
(4) Measuring the self-efficacy and the effectiveness of the ESP students in the learning environment in (3).

We pose two research questions below. By answering the two research questions (RQs) below, we will see what type of ESP e-learning environment might help students in acquiring ESP vocabulary and what elements, such as those proposed by Coryel and Chlup (2008), ESP teachers should consider when assisting students.

RQ 1. Which learning method is most effective for helping ESP students learn vocabulary items: a) Paper-based, b) e-learning or c) digital material integrated with e-learning?
RQ 2. Which of the above three methods can most influence students' motivation?

METHODOLOGY

Compiling an ESP Corpus

The authors used the ESP Corpus that Ohashi, Katagiri, and Oka (2018) compiled. This is called "the Veterinary Nursing Medical Chart (VNMC) Corpora" (Ohashi et al. 2018, p. 317). As the name of the corpus identifies itself, the VNMC corpora contain words used in 240 medical charts that veterinarians recorded in animal hospitals and an additional 220 documents that veterinary nurses recorded for the patients' (i.e., animals') treatment. The words from the medical charts and records were annotated in an Extensible Markup Language (XML) for the intended extraction of words depending on research purposes, for example, what symptoms the canine exhibits most often compared to felines.

Selecting ESP Vocabulary Items

The authors selected veterinary vocabulary items for the present study from the VNMC corpora. They selected the items by excluding the lexemes in the General Service List (West, 1953) and the Academic Word List (Coxhead, 2000).

Participants. Approximately 150 first-year students studying veterinary nursing at a university for veterinary medicine participated in this study. They agreed to participate in this research upon filling out consent forms to provide their vocabulary test results and written survey answers.

Vocabulary Materials. This study utilized the three learning vocabulary materials. We extracted 138 vocabulary items (which were not included in GSL or AWL) from the VNMC corpora that were commonly observed in five different categories; they were: "Dermatitis," "ophthalmology," "vaccine," "vomit," and "lameness." We randomly chose 46 words from this wordlist (see Appendix A for the entire wordlist) and assigned it to the three different material types, i.e., paper-based, e-learning, and e-learning with a digital audio-visual element.

Paper-based materials. The paper-based materials contain a table of selected veterinary medicine ESP vocabulary items with Japanese translations (Table *1*). We used the materials for ESP English classes for one semester. We encouraged the participants to learn the word list by heart over the course of the semester.

Table I: Samples of the Paper-based Vocabulary Learning Materials

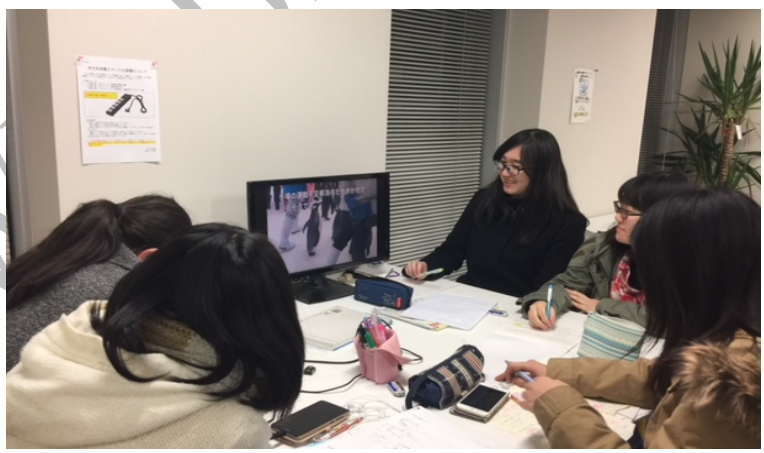
Word type	日本語 [Japanese translation]
NASAL DISCHARGE	鼻汁
CANINE	イヌ科、犬の
THORAX	胸部
RECTUM	直腸（名詞）
ALLERGY	アレルギー
MAMMARY GLAND	乳腺
GENITALIA	生殖器
PULSE	脈
SPECIES	種

E-learning materials. The second material type utilized *Quizlet* (Southerland, 2007), a web-based tool for vocabulary learning. Quizlet allows instructors to create various digital vocabulary learning materials, such as flashcards, closed tests, writing tests, and so on. After downloading Quizlet for free on its website, the students can access the material anytime and anywhere to learn the ESP wordlist from their PCs or mobile devices. Thus, they can use the materials freely and learn the target vocabulary items as long as they have an Internet connection available. Several studies confirm the advantage of Quizlet for intentional vocabulary learning compared with paper-based vocabulary learning tools (Blair & Barr, 2016; Dizon, 2016; Sato, Murase, & Burden, 2015).

E-learning integrated with digital materials. The third type of learning materials aimed at taking advantage of audio-visual information complete with the ESP vocabulary items and their translations. We played video clips taken at an animal hospital in the U.S.A. to the participants. The video clips had subtitles for the veterinary ESP words from the wordlists. Figure *I* is a sample extract from the digital material. The participants watched the clips on a 50-inch monitor in a university cafeteria (where a number of students gather) from 9:00 am to 6:00 pm during the experiment period. We set a timer to turn a monitor on at 9:00 am and off at 6:00 pm. Thus, we expected the participants to watch and learn the ESP vocabulary items while they were in the cafeteria (Figure II).

Figure I: A sample of digital material

Figure II: Integrated e-learning materials placed in the university cafeteria



Experimental Study

The experimental study tested the effectiveness of the three ESP vocabulary materials in the previous section. We sorted the participants into three groups and assigned them to learn the three types of materials; (a) learning the paper-based ESP vocabulary items, (b) e-learning the ESP materials through online software, i.e., Quizlet, and (c) learning the ESP lexemes through audio-visual materials integrated with e-learning software. The participants in three different material groups learned the ESP vocabulary items over three months. The participant took a vocabulary progress test after three months. All the participants took the same vocabulary progress test based on the type of ESP vocabulary materials they used for learning. The test included 46 ESP vocabulary items from the extracted wordlist. Each question asked the participants to translate Japanese words into English (Section 1) and to translate English words into Japanese (Section 2). At the beginning of each week, we gave the participants pretests and post-tests were given three months later. We compared the test scores of the three groups and measured the effectiveness of the three types of ESP vocabulary materials.

Motivation Questionnaire. We measured the participants' English learning motivation by utilizing the English learning motivation scale for veterinary nursing students developed by Sekitani, Ohashi and Katagiri (2017). The scale comprised the following four factors: (a) *General knowledge and training* with 12 items (e.g., "I want to understand English better"), (b) *practical use for veterinary medicine* with ten items (e.g., "If I cannot speak English, I will be in trouble when a foreign patient comes"), (c) *life and study overseas* with six items (e.g., "English is necessary to study abroad"), and (d) *passive sense of obligation* with four items (e.g., English classes are required subjects). Participants were asked to answer the question, "Why do you study English?" Responses were selected from a five-point scale ranging from 1 ("not true at all") to 5 ("absolutely true"). After collecting the participants' responses on the motivation scale, we calculated the mean score of each factor. In the questionnaire, participants added their opinions regarding the ESP vocabulary learning methods they used to learn the vocabulary items.

RESULTS AND DISCUSSION

We conducted statistical tests to examine the efficacy and the effects of e-learning and digital materials on both low and high-proficiency-level students.

Multivariate Analyses

This section provides the results of a two-way multivariate analysis of variance (MANOVA) to examine the relationship between the independent variables, e.g., the type of materials, learners' proficiency levels, and the interaction of these two, and the dependent variables, the vocabulary

test scores and each motivational factor. Table II illustrates the means of the pre-post vocabulary test score differences and the four motivation factors in each group.

Table II: Means (SDs) of the Pre-Post Vocabulary Test Score Differences of the Vocabulary Test and Motivation

		Proficiency level	Type of materials: Paper-based	E-learning	Didigal	Total
Vocabulary test		Low	4.50 (5.57)	10.45 (7.77)	6.32 (6.39)	6.73 (6.92)
		High	-1.69 (9.00)	12.60 (12.33)	11.69 (12.14)	6.63 (12.92)
		Total	1.34 (8.10)	11.65 (10.56)	9.34 (10.33)	6.68 (10.57)
Motivation	General knowledge and training	Low	0.05 (0.66)	0.04 (0.49)	-0.12 (1.04)	0.01 (0.73)
		High	0.03 (0.37)	0.16 (0.65)	-0.01 (0.62)	0.06 (0.54)
		Total	0.04 (0.53)	0.11 (0.58)	-0.06 (0.83)	0.04 (0.64)
	Veterinary medicine	Low	0.00 (0.67)	0.11 (0.61)	0.15 (1.01)	0.07 (0.75)
		High	0.00 (0.53)	0.20 (0.75)	-0.13 (0.66)	0.03 (0.65)
		Total	0.00 (0.60)	0.16 (0.69)	-0.01 (0.84)	0.05 (0.70)
	Life and study overseas	Low	-0.04 (0.61)	-0.01 (0.54)	-0.39 (0.82)	-0.12 (0.66)
		High	0.02 (0.54)	0.17 (0.75)	-0.11 (0.52)	0.03 (0.61)
		Total	-0.01 (0.57)	0.09 (0.66)	-0.23 (0.68)	-0.04 (0.64)
	Passive sense of obligation	Low	-0.12 (0.53)	0.16 (0.66)	0.17 (1.01)	0.04 (0.72)
		High	-0.06 (0.47)	-0.01 (0.48)	0.10 (0.75)	0.00 (0.56)
		Total	-0.09 (0.49)	0.07 (0.57)	0.13 (0.86)	0.02 (0.64)

Table III shows the results of the two-way MANOVA. We can see a significant main effect of the type of materials on the dependent variables (Pillai's Trace = 0.274, $F = 7.371$, $p < .000$, $\eta_p^2 = .137$) and a significant interaction between the type of materials and English proficiency level (Pillai's Trace = 0.113, $F = 2.791$, $p = .002$, $\eta_p^2 = .057$). No significant main effect of English proficiency level was observed (Pillai's Trace = 0.038, $F = 1.821$, $p = .110$, $\eta_p^2 = .038$).

Given the significance of the overall multivariate test, we examined the univariate main effects of type of materials and univariate interactions. Table IV displays a significant interaction for the vocabulary test (F (2, 235) = 8.767, $p = .000$, $\eta_p^2 = .069$). A simple main effect of the type of materials in the high English proficiency group was observed (F (2, 268) = 44.221, $p = .000$, $\eta_p^2 = .248$). Bonferroni's method for multiple comparisons revealed that in the high English proficiency group, the pre-post score difference of the vocabulary test in the e-learning group was larger than that of the paper-based group ($p < .001$), and the score difference in the digital group

was larger than that of the paper-based group ($p < .001$) as shown in Figure Ⅲ. We also observed simple main effects of English proficiency level in the paper-based and the digital materials groups (F (1, 268) = 21.129, p =.000, η_p^2 = .073; F (1, 268) = 4.778, p = .030, η_p^2 = .018).

Table Ⅲ: Summary of MANOVA Results with Type of Materials, English Proficiency Level and their Interaction as Independent Variables, and Pre-Post Score Differences of the Vocabulary Test and Motivation as Dependent Variables

Effect	Value of Pillai's Trace	*F*	Hypothesis df	Error df	*p*	η_p^2
Intercept	0.402	31.037	5.000	231.000	.000	.402
Type of Materials	0.274	7.371	10.000	464.000	.000 ***	.137
English Proficiency Level	0.038	1.821	5.000	231.000	.110	.038
Type of Materials*English Proficiency Level	0.113	2.791	10.000	464.000	.002 **	.057

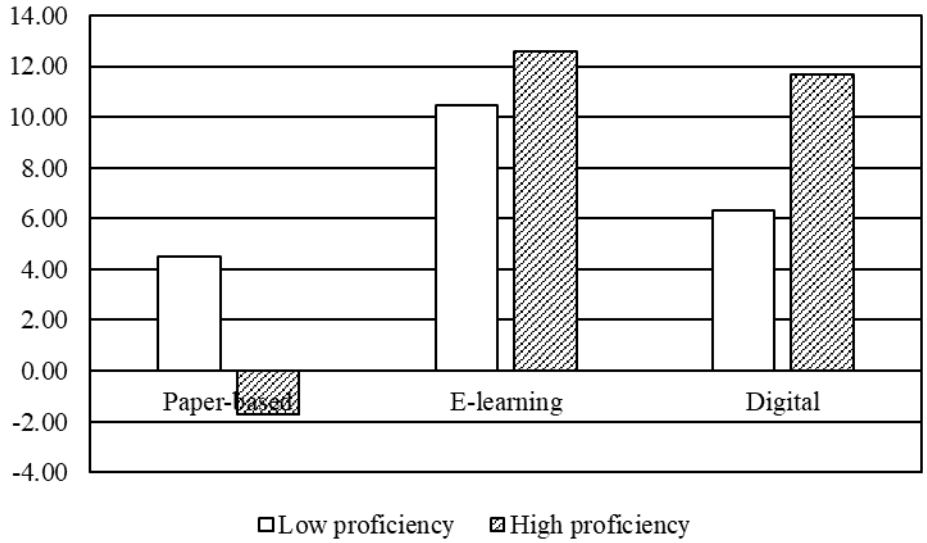
Note. **$p < .01$ **$p < .001$

Table IV: Between-Subjects Effects of the Two-Way ANOVA Results on the Pre-Post Vocabulary Test Score Differences and Motivation Factors

Source		*df*	*SS*	*MS*	*F*	*p*	η_p^2
Intercept	Vocabulary test	1	12273.192	12273.192	143.667	.000	.379
	General	1	0.155	0.155	0.380	.538	.002
	Veterinary	1	0.697	0.697	1.430	.233	.006
	Overseas	1	0.889	0.889	2.256	.134	.010
	Obligation	1	0.375	0.375	0.928	.336	.004
Type of Materials	Vocabulary test	2	4910.297	2455.148	28.739	.000 ***	.197
	General	2	0.912	0.456	1.117	.329	.009
	Veterinary	2	1.154	0.577	1.185	.308	.010
	Overseas	2	3.916	1.958	4.970	.008 **	.041
	Obligation	2	2.253	1.126	2.787	.064	.023
English Proficiency Level	Vocabulary test	1	11.133	11.133	0.130	.718	.001
	General	1	0.260	0.260	0.636	.426	.003
	Veterinary	1	0.192	0.192	0.395	.530	.002
	Overseas	1	1.722	1.722	4.371	.038 *	.018
	Obligation	1	0.218	0.218	0.540	.463	.002
Type of Materials*English Proficiency Level	Vocabulary test	2	1497.821	748.910	8.767	.000 ***	.069
	General	2	0.279	0.139	0.341	.711	.003
	Veterinary	2	1.292	0.646	1.327	.267	.011
	Overseas	2	0.478	0.239	0.607	.546	.005
	Obligation	2	0.520	0.260	0.643	.526	.005
Error	Vocabulary test	235	20075.624	85.428			
	General	235	95.904	0.408			
	Veterinary	235	114.429	0.487			
	Overseas	235	92.577	0.394			
	Obligation	235	94.965	0.404			

Note. $*p < .05$ $**p < .01$ $**p < .001$

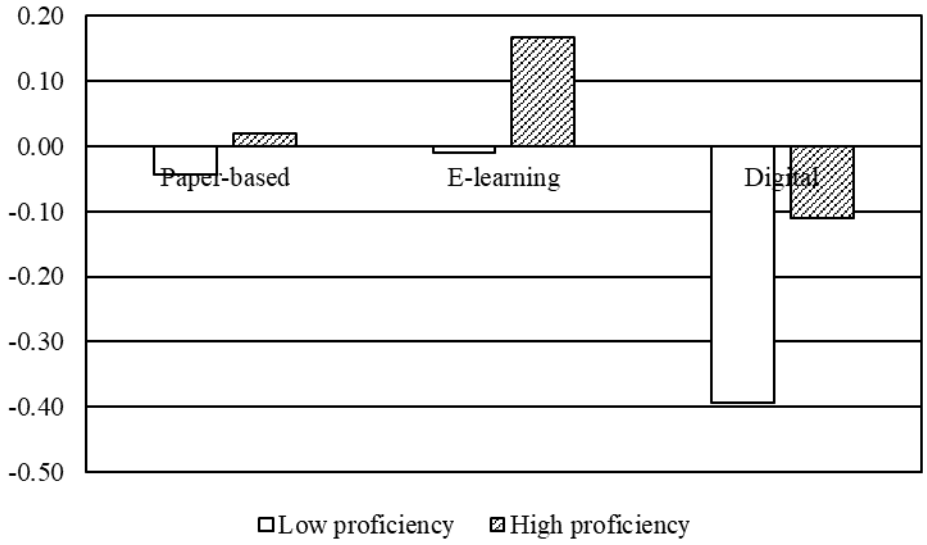
Figure Ⅲ: Pre-post Score Differences of the Vocabulary Test



Motivational factors

For "life and study overseas," a significant main effect of English proficiency level was obtained (F (2, 235) = 4.371, p = .038, η_p^2 = .018). Overall, the pre-post score difference was larger in the high English proficiency group. Also, a significant main effect of type of materials was obtained (F (2, 235) = 4.970, p = .008, η_p^2 = .041). Bonferroni's method for multiple comparisons revealed that the pre-post score difference in the e-learning group was larger than that in the digital group (p = .008). Figure Ⅳ illustrates the results. No significant main effects or interactions were observed for any of the other dependent variables.

Figure IV: Pre-post Score Differences of Life and Study Overseas



Qualitative Analyses

Engagement in the program. Statistical results based on the students' entire scores implied that e-learning materials had the largest effects on students' vocabulary learning improvement; on the other hand, qualitative aspects revealed additional perspectives.

The participants' open written answers on the questionnaire distinguished those who failed to watch the digital materials from those who willingly engaged in the program. Thus, we further examined the progress values in vocabulary tests (subtracting the post-test raw score from the pretest raw score) between the students who failed to study through the program more than once and those who engaged in the program more than twice, as instructed, on both low and high proficiency levels.

The results of the two-way ANOVA (Table Ⅴ) indicated a significant main effect between the students who engaged in the program and those who failed to participate (F (1, 119) =45.5, p = .000) and a nonsignificant effect for the proficiency level (F (1, 119) =1.27, p = .262). The relationship between proficiency level and student engagement in the program disclosed no significant interaction term (F (1, 119) =1.31, p = .255).

These results signify that digital materials helped students improve their vocabulary regardless of their proficiency level, as long as they accurately engaged in the program as instructed.

Language proficiency levels. Following these results, we also examined the vocabulary test progress values between the low and high-proficiency level students in the e-learning group to examine whether statistical results show differences between low and high levels, which were not observed in the digital group. An independent-samples *t*-test was conducted to evaluate the hypothesis that there is no statistical difference between low and high proficiency levels. The test was significant, t (131) = -2.55, p = .01, d = 0.3, and the results were counter to the hypothesis. The effects on high-proficiency level students (M = 18.8, SD = 13) were higher than those of low-proficiency level students (M = 12.7, SD = 13.2).

The above results imply that a single e-learning program had larger effects on high-proficiency level students while the e-learning program integrated with digital materials was more effective for both low and high-proficiency level students.

Table V: Summary of Two-way ANOVA Results with Engagement, English Proficiency Level, and Their Interaction

Source	*SS*	*df*	*MS*	*F*	*p*	η_p^2
proficiency	70.473	1	70.473	1.273	.262	.011
engagement	2517.287	1	2517.287	45.459	.000	.276
proficiency*engagement	72.588	1	72.588	1.311	.255	.011
error	6589.620	119	55.375			
sum	9195.041	122				

DISCUSSION

Answers to the Research Questions

RQ 1. Which learning method is most effective for helping ESP students learn vocabulary items: a) Paper-based, b) e-learning or c) digital material integrated with e-learning?

We confirmed the pedagogical benefit of the corpus-based ESP ICT materials, because our finding indicated that vocabulary growth after learning through both e-learning and digital material, integrated with e-learning, was more significant than the growth provided by learning through paper-based materials.

Regarding the students' learning motivation and vocabulary proficiency, the results of the MANOVA (Table Ⅲ) conveyed a more significant effect on the higher proficiency level students

of the e-learning group than in the other two groups (the paper-based material group and their digital materials integrated with the e-learning group). Although the e-learning group saw significant vocabulary growth, the differences in students' vocabulary progress between e-learning and digital groups were insignificant, implying that both learning materials have the same statistical effects. On the one hand, having students learn through e-learning materials seems to have resulted in the most effective learning gains. On the other hand, the second statistical analysis implied that, if learned accurately as instructed, the digital materials integrated with the e-learning software yielded the most favorable effect.

We should also mention the participants' language proficiency levels. The difference in vocabulary growth between low and high proficiency levels in the digital group was not significant, however, the growth in higher proficiency levels in the e-learning group was statistically larger than the growth in the lower level. These results can shed light on the effectiveness of the digital materials integrated with e-learning on ESP students with varying language proficiency levels.

RQ 2. Which of the above three methods can most influence students' motivation?
Qualitatively, the motivation factor, "veterinary medicine," attracted slightly higher value in the digital group than the other two groups (Table Ⅱ). This result implies that digital programs possibly facilitate beginner-level students' willingness to utilize what they have learned. The low-proficiency participants benefitted from the visual aids because they willingly engaged themselves in output activity. This provides further support for providing the ESP vocabulary items by using visual aids.

Findings

Benefits of the digital ESP materials. Overall, both e-learning and digital materials integrated with e-learning had favorable effects on the participants in learning specific ESP vocabulary items. Judging from the students' vocabulary scores, students who willingly studied watching digital materials significantly advanced more than those who failed to accurately watch the digital (audio-visual) materials. These findings imply that failure to engage participants in learning the ESP vocabulary items with digital materials provoked little effect on the participants' learning even though the digital materials were programmed correctly for the students, which we confirmed in the participants' comments in the questionnaires as well.

The findings of this study corroborate the statement of Sykes and Reinhardt (2012) and Micheal (2019) that pointed out the importance of combining theory-based pedagogy, such as the task-based method, with digital materials. Without accurate instructions based on a theory, some

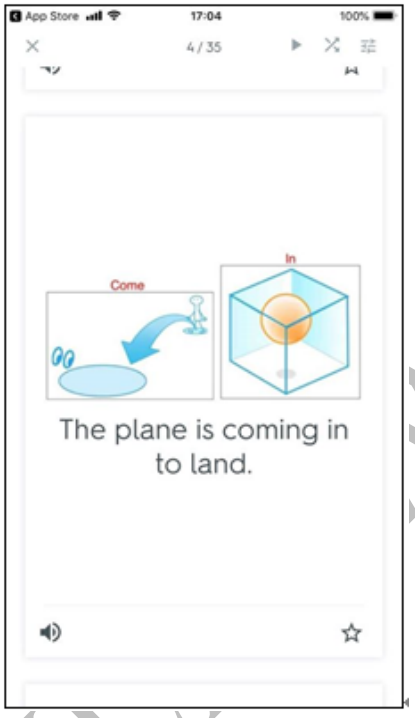
students might learn the materials successfully, although some might fail to study. In this sense, this study unveiled some challenges, such as how we should construct an e-learning system that utilizes digital materials.

Participants' comments on e-learning. The written answers in the questionnaire also revealed that some participants were plagued by the complicated procedures required to start the computer-oriented tasks. The teachers needed to provide participants with accurate instructions before and during their learning. We should also consider students' computer literacy. Concerning a lack of "support and collaboration" that Coryel and Chlup (2008) considered necessary in students-centered, computer-based learning, this issue implies that the teachers' systematic support will help students appropriately conduct their learning. A whole program should be student-centered; however, students also want their teachers' support and feedback.

Students' written comments in the questionnaire also revealed further challenges. Some participants found the settings of the digital learning programs uncomfortable, complaining, "when there were many students in the students' lounge, we did not feel like learning vocabulary by watching the digital materials, although we knew the video was quite interesting." Creating a comfortable learning environment is one of the challenges that must be addressed before introducing digital materials in educational facilities.

Participants preferred a self-learning environment to one where they must share the digital ESP materials with other participants. Elaborating on e-learning programs covering digital materials might provide a better learning environment because the students could watch digital materials without being disturbed by other students. For example, adding a picture related to each vocabulary item in Quizlet might help (see the example Quizlet on iPhone in Figure V).

Figure V: A screenshot of a vocabulary item in Quizlet on an iPhone



We conclude the paper by listing the findings below:

a) Using ICT materials in ESP education promotes more effective learning of specific vocabulary items than paper-based materials.

b) Unless students accurately carry out the ESP digital program as instructed by teachers, the ESP digital program integrated with the e-learning system, they might miss out on favorable effects.

c) E-learning programs are more effective for highly proficient leveled students than those with low proficiency.

d) Digital programs are likely to help develop students' vocabulary, regardless of their proficiency.

e) Visual aid can increase students' willingness to output their learning, especially among low-proficiency students.

CONCLUSIONS

We need to construct an ESP digital learning system that meets the following requirements:

a) Establishes a student-centered but collaborative learning system

b) Provides occasional teachers support for students in need of help, including face-to-face talks
c) Engages students stepwise in the learning system without fail
e) Facilitates students' willingness to learn and monitor their learning process

This study revealed the effectiveness of adopting e-learning programs to help students learn specific vocabulary items in the veterinary medical ESP field. Visual aids through ESP digital materials resulted in positive outcomes for the students, who willingly engaged in the learning system. We may need to modify the system for future implementation. A failure to conduct a delayed post-test could be considered a limitation. Delayed post-test results enable the further analysis to examine whether visual aids help students remember things longer. As long as the learning system is student-centered and the students "see" or actually engage in the digital learning program, we expect a lasting effect on the student's learning.

As Sykes (2017) pointed out, blended learning allows learners to expand further target language exploration without a time commitment from teachers. However, teachers should give the students occasional feedback that would support them psychologically and, thus, pedagogically. Further detailed research will effectively assist teachers in supporting student-centered digital or e-learning programs. Possible engagement by teachers includes giving learners regular tests with feedback based on their test results and providing learners with mental support to help students pursue their individual goals.

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REFERENCES

Aijmer, K. (2009). *Corpora and language teaching*. Amsterdam: John Benjamins.

Akano. I., Hori, M., & Tono, Y. (Ed.). (2014). *Eigo kyoushi no tameno corpus katuyou gaido* [A practical guide to using corpora in English language teaching]. Tokyo: Taishukan.

Askov, E. N., Johnston, J., Petty, L. I., & Young, S. J. (2003). *Expanding access to adult literacy with online distance education*, Cambridge, MA: National Center for the Study of Adult Language and Learning.

Blair, Q., & Barr, W. B. (2016). Checking the effectiveness of Quizlet as a tool for vocabulary learning. *The Center for ELF Journal, 2(1),* 36-48.

Boulton,A., Thomas, C. S., & Jolivet, R. E. (2012). *Corpus-Informed Research and Learning in ESP*. John Benjamins. Amsterdam.

Coxhead, A. (2014). Corpus linguistics and vocabulary teaching: perspectives from English for specific purposes. in M. Gotti, and D.S. Giannoni, (eds.), *Corpus analysis for descriptive and pedagogical purposes,* pp. *289-301.* pp. 115-135. Peterlang.

Coxhead, A. (2000). A New Academic Word List. *TESOL QUARTERLY 34*(2), 213-238.

Coryel & Chlup (2008). Implementing E-Learning components with adult English language learners: Vital factors and lessons learned. *Computer-Assisted Language Learning 20* (3). 263-278.

Crawford, C. B. (2007). *The language of business studies lectures.* Amsterdam: John Benjamins.

Dizon, G. (2016). Quizlet in the EFL classroom: Enhancing academic vocabulary acquisition of Japanese university students. Teaching English with Technology, 16(2), 40–56. Retrieved from http://www.tewtjournal.org

Drennan, J., Kennedy, J., & Pisarski, A. (2005). Factors affecting student attitudes toward flexible online learning in management education. T*he Journal of Educational Research, 98*(6): 331–338.

Katani, K., Yoshimi, T., Nanjo, H., & Isohara, H. (2016). A corpus of writing, pronunciation, reading, and listening by learners of English as a foreign language. *English Language Teaching*, 9 (9), 139-155.

Maniez, F. (2012). A corpus based study of adjectival vs nominal modification in medical English. In A. Boulton, S. C. Thomas, and E. R. Jolivet (Ed.), *Corpus- informed research and learning in ESP* (pp. 83-101). Amsterdam: John Benjamins.

Micheal, T. (2019). *Digital technologies for language learning and teaching.* Routledge.

Mohsen, M. A., & Balakumar, M. (2011). A review of multimedia glosses and their effects on L2 vocabulary acquisition in CALL literature. ReCALL, 23(2), 135–159. https://doi.org/10.1017/S095834401100005X

Ohashi, Y., Katagiri, N., & Oka, K. (2018). Regular Expressions and Annotation Design for ESP Corpus Compilation – Compilation of Veterinary Nursing Medical Chart Corpus. *The Asian ESP Journal 14*(1), 312-341.

Peterson, M. (2013). *Computer games and language learning*. New York: Palgrave Macmillan.

Petty, L. I., Johnston, J., & Shafer, D. (2004). *Distance education for adult learners* Retrieved from http://www. projectideal.org/http://www. projectideal.org/ pdf/handbook/DEHandbook3rdEdTEXT2!.pdf

Rusanganwa, J. A. (2015). Developing a multimedia instrument for technical vocabulary learning: a case of EFL undergraduate physics education. Computer Assisted Language Learning, 28(2), 97–111.

Sato, T., Murase, F., & Burden, T. (2015). Is mobile-assisted language learning really useful? An examination of recall automatization and learner autonomy. Proceedings of the 2015 EUROCALL Conference, 495–501. https://doi.org/10.14705/rpnet.2015.000382

Sekitani, K., Ohashi, Y., & Katagiri, N. (2017). *Doubutsu kango gakusei no eigo gakushu douki shakudo no kaihatsu* [Development of an English learning motivation scale for veterinary nursing students]. *CASELE Research Bulletin, 48*, 43-52.

Squire, K. D. (2009). Mobile media learning: Multiplicities of place. *Horizon*, *17*, 70–80.

Sykes, J. (2017). Digital games and language teaching and learning. *Foreign Language Annals, 51*, 219-224.

Sykes, J., & Reinhardt, J. (2012). Language at play: Digital games in second and foreign language teaching and learning. In J. Liskin-Gasparro&M. Lacorte (Series Eds.), *Theory and practice in second language classroom instruction* (pp.1–157). New York: Pearson-Prentice Hall.

Thomas, M. (2012). Contextualizing digital game-based language learning: Transformational paradigm shift or business as usual. In H. Reinders (Ed.), *Digital games in language learning and teaching* (pp. 11–31). New York: Palgrave Macmillan.

Türk, E., & Erçetin, G. (2014). Effects of interactive versus simultaneous display of multimedia glosses on L2 reading comprehension and incidental vocabulary learning. Computer Assisted Language Learning. https://doi.org/10.1080/09588221.2012.692384 West, M. (1953). *A general service list of English words.* Longman: Essex

Appendix: A Sample list of vocabulary items used for this study and the frequency of occurrence
1= Vomit, 2= Vaccine, 3= Ophthalmology, 4= Lameness, 5= Dermatitis

	Total Frequency	1	2	3	4	5	日本語
NASAL DISCHARGE	317	26	39	110	44	98	鼻汁
CANINE	297	15	41	31	76	134	イヌ科、犬の
THORAX	210	20	32	48	30	80	胸部
RECTUM	208	21	32	48	30	77	直腸(名詞)
ALLERGY	205	16	11	34	22	122	アレルギー
MAMMARY GLAND	204	20	31	49	30	74	乳腺
GENITALIA	203	20	32	48	30	73	生殖器
PULSE	182	16	17	35	32	82	脈
SPECIES	170	10	1	37	27	95	種
VACCINATION	149	13	33	30	21	52	ワクチン接種
PRESCRIPTION	146	12	20	30	13	71	処方箋
HEARTWORM	131	10	18	23	26	54	フィラリア
INFLAMMATION	131	12	16	12	35	56	炎症
ABDOMEN	126	13	17	26	15	55	腹部
VOMIT	120	49	33	8	7	23	嘔吐する
CALCULUS	118	9	12	32	21	44	結石
RABIES	118	10	28	15	21	44	狂犬病
DOSE	117	12	38	25	12	30	投与量・服用量
LESIONS	116	10	16	29	17	44	病変・損傷
LAMENESS	115	8	16	20	35	36	跛行・歩行困難
MURMUR	115	10	16	26	19	44	心雑音
RESPIRATORY	115	9	2	28	15	61	呼吸の
URINARY	111	9	1	24	15	62	尿の
FLEA	110	10	15	15	15	55	ノミ
OUTPATIENT	110	10	5	24	15	56	外来患者
NEUROLOGICAL	109	9	1	26	15	58	神経学の
ALERT	105	10	15	25	16	39	警告・警戒
ABNORMALITIES	104	10	16	23	18	37	異常
GLAND	104	11	15	24	16	38	腺・分泌腺
CYSTS	103	10	16	24	15	38	嚢胞
WITHERS	103	10	16	25	15	37	(犬や馬などの)き甲
LOCOMOTION	102	10	17	24	15	36	運動
VITAL SIGNS	102	10	15	25	17	35	バイタルサイン
GAIT	101	10	16	26	13	36	歩行・足取り
SYNCHRONOUS	101	10	16	24	15	36	同時に起こる
CAVITY	100	10	16	22	15	37	虫歯
ORGANOMEGALY	100	10	15	24	15	36	臓器肥大症
PALPABLE	100	10	15	24	15	36	触診可能な
NON-PAINFUL	99	10	15	24	14	36	無痛の
EUPNEA	98	10	14	24	15	35	正常呼吸
AMBULATORY ABILITY	97	10	15	24	11	37	歩行能力
TABLET	95	14	7	9	32	33	錠剤
CHRONOLOGICAL	91	3	32	16	27	13	年代順の・時系列の
VITALS	90	7	18	18	24	23	器官
ODOR	86	8	14	17	8	39	匂い、香り

DVM (doctor of veterinary medicine)	85	7	15	23	13	27	獣医
MEDICATION	85	5	28	19	4	29	薬物・薬剤
VETERINARIAN	79	6	32	11	7	23	獣医
DRUG	76	6	17	15	7	31	薬
THERAPY	76	8	19	14	6	29	治療
ADMINISTER	74	5	21	14	18	16	投与する
DISPOSITION	69	7	7	21	11	23	傾向・性質
RECTAL	69	4	19	13	16	17	直腸の（形容詞）
HEIGHT	64	7	14	13	7	23	体高・肩高
SNAP	64	3	9	14	15	23	（パクリ）と噛む
DIARRHEA	58	17	13	5	5	18	下痢
DEWORMING	56	6	11	8	7	24	駆虫
APPETITE	48	8	9	14	5	12	食欲
VACCINES	48	3	16	10	5	14	ワクチン
ITCHING	42	1	3	1	4	33	痒み
TICK	40	4	3	7	9	17	ダニ
VET	39	2	1	10	8	18	獣医
FACIAL INJURIES	38	2	16	5	7	8	顔面の負傷
QUARANTINE	38	2	3	1	21	11	隔離・隔離する
HYPOALLERGENIC	37	4	2	6	2	23	低刺激性の・低アレルゲンの
INTRANASAL	37	1	10	6	6	14	鼻腔内の
SPAYED	37	4	2	11	1	19	（雌が）避妊手術を受けた
NEUTERED	33	5	4	3	8	13	（雄が）去勢した
TRIM	33	2	5	5	9	12	（犬・猫の毛を）手入れする
SNEEZING	32	1	2	18	4	7	くしゃみ
ADVERSE	30	2	16	4	1	7	逆の・反作用の
ANTIGEN	28	1	8	1	7	11	抗原
CHEWABLE	26	1	2	3	15	5	噛み砕ける・チュアブルタイプの
CLINIC	26	2	2	9	4	9	病院
VACCINATED	25	2	11	4	1	7	予防接種を受けている
PRESCRIBED DIET	22	2	7	3	2	8	既定食・処方食
MICROCHIP	21	3	3	5	1	9	マイクロチップ
BOOSTER INOCULATION	17	1	4	4	1	7	追加接種
INTACT	16	1	2	4	4	5	無傷の・去勢（避妊されていない）
OVERWEIGHT	16	1	1	7	3	4	太りすぎの
COMPLY WITH	14	1	7	1	1	4	～を遵守する
MINIATURE	14	1	2	1	2	8	小型の
PRESCRIBE A COMPLETE REST	14	1	7	1	1	4	絶対安静を命じる
DEWORM	13	2	1	3	1	6	駆虫する
IMPLANT	12	2	1	3	1	5	移植する・着床する