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Effects of MOOC and video conferencing deliveries on vocabulary usage and learning strategies

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ABSTRACT

While vocabulary learning strategies (VLSs) have primarily been taught in physical classroom settings, the potential for applying strategy training in an online environment remains under-explored. With the rising acceptance of remote education, there is a need to investigate the impacts of applying strategy training in online contexts. Hence, this study explores the effects of online deliveries on VLSs and vocabulary usage in writing among adult English as second language (ESL) learners via massive open online course (MOOC) and video conferencing platforms. A total of 50 pre-intermediate ESL learners completed a 5-week VLSs course on a MOOC while 44 students learnt from the instructor synchronously using Microsoft Teams. The data comprised questionnaires and learners' compositions, which were collected before and after treatment. The data analysis procedures involved Lextutor's version of lexical frequency profiling (LFP), descriptive and inferential statistics. The results revealed that there was a significant increase of usage in all categories of the VLSs after the course for both groups. Additionally, the effects of VLSs instruction on vocabulary usage could be reflected in both groups' writing though the choice of words might have been task-influenced. The findings from this study could yield useful insights on online vocabulary learning for ESL instructors and learners.

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1. INTRODUCTION

The vocabulary is fundamental to language learning; it has a vital role in both receptive and productive skills associated with effective communication. The importance of vocabulary learning has been acknowledged and reiterated through numerous studies [1]-[4]. Vocabulary learning may seem easy and direct, but the process of learning vocabulary is not straightforward. In fact, vocabulary learning is challenging for many learners [5], particularly English as second language (ESL) learners who are not exposed to the natural context of acquiring vocabulary.

Often, language learners have some difficulties remembering a large repertoire of words to achieve fluency [6]. When they fail to do so, they are unlikely to express themselves effectively. Hence, some learners require more assistance from these strategies and a longer time due to the nature of the first language (L1) and second language (L2) [7]. Due to this, vocabulary learning strategies (VLSs) instruction should be taught; to assist students at all levels to become better language learners. The values and applications of learning strategies should be made explicit [8]. When learners are given instructions in using strategies, it

will assist them in using suitable strategies for types of vocabulary learned [9]. Furthermore, learners who apply learning strategies in vocabulary learning would begin to understand the progress of their learning.

VLSs have been taught by some language instructors in conventional classroom settings. However, the impetus to shift to online learning in recent years has required educators and learners to utilize online platforms for teaching and learning processes. This phenomenon has also affected how teachers attend to the technology-assisted VLS instruction. Thus, it is essential to investigate the effects of strategy training in online contexts.

Several studies have tapped into investigating the impacts of technology-based VLSs instruction in several aspects. Rahimi and Allahyari [10] explored the impact of multimedia-assisted VLSs instruction on learners' strategy use and vocabulary learning. They discovered that the VLSs instruction promoted learners' general use of VLSs and increased their vocabulary size. Additionally, Gay [11] examined the effects of providing technology-enhanced VLSs instruction among mixed-ability learners on an English medium instruction (EMI) course. His study discovered that the VLSs instruction has aided learners in developing vocabulary proficiency and may aid them in attaining higher content-essay scores.

In addition, Wu *et al.* [12] found that technology-based VLSs increased the learners' overall strategy use in self-directed vocabulary learning while Kiliçkaya and Krajka [13] study discovered it enhanced the vocabulary retention and raised learners' awareness of strategy use. Moreover, Li [14] research revealed that learners employed a variety of strategies: cognitive, compensatory, metacognitive, and social categories when they learnt vocabulary in a computer-mediated environment.

While these studies [10]-[14] have shown the benefits of technology-based VLSs instruction on learners' use of vocabulary strategies in their vocabulary learning, there has been limited research into the effects of VLSs on learners' productive vocabulary. Aside from analyzing learners' vocabulary levels and the strategies used, it would be crucial to investigate if vocabulary strategy instruction has an impact on language skills, particularly learners' productive vocabulary.

Furthermore, most of the studies [10]-[14] mentioned have compared the effects of technology-based VLSs instruction versus traditional method. However, the impacts of VLSs instruction via two types of technological modes of delivery have not been explored. By comparing both modes, instructors may make well-informed decisions to optimize learning outcomes and provide engaging and effective educational experiences. Hence, this study aims to investigate the impacts of technology-based VLSs instruction via two predominant online modes of delivery, which are massive open online course (MOOC) and video conferencing on VLSs and vocabulary usage in writing.

MOOC provides instructions and information in replacement of face-to-face classes. The interactions among learners are often in the form of discussion boards and forums. Most MOOC courses are top down. They aim to transfer the university-level content to a large audience [15]. In the aspect of language MOOCs (LMOOCs), studies by Bárkányi [16], Gilliland *et al.* [17] and Monje *et al.* [18] have revealed that LMOOCs can be used to teach language learners in different language aspects. However, Vorobyeva [19] elucidated that LMOOCs are more appropriate for reading, listening and vocabulary as these are deemed more suitable for independent learning. Despite this shortcoming, LMOOCs enable learners from different parts of the world to learn from a course offered by experts.

While a MOOC allows the flexibility to learners to learn at their own pace and time, video conferencing platforms require instructors and learners to meet in real time. During the Covid-19 pandemic, instructors resorted to what they viewed as natural, synchronous communication and attempted to mirror classroom conditions through video conferencing meetings [20]. A study by Lenkaitis [21] on an L2 course revealed that synchronous learning through a video conferencing platform assisted learners to develop learner autonomy and it also provided an authentic language learning experience. Furthermore, the multimedia features available in video conferencing enabled instructors and learners to express themselves through visuals, audio and verbal communication [20]. Compared to communication via text only, interaction could be direct and made clearer.

With the vast availability of these online platforms, it is even more pertinent for learners to receive language learning strategies instructions. This is primarily due to the fact that those who receive language learning strategy instructions in the digital age perform better in comparison to those who have not received such training [22]. With this in view, there is a need for further research in comparing the modes of online delivery used to enhance VLS instruction. These two modes of online deliveries have been widely used in recent times and it is important to draw the distinctions of the effects of learning vocabulary via these platforms. In line with that, this study aims to explore the following research questions: i) How does the VLS instruction affect the tertiary ESL learners' VLSs in the MOOC and video conferencing groups? and ii) How does the VLS instruction affect the tertiary ESL learners' vocabulary usage in writing in the MOOC and video conferencing groups?

2. RESEARCH METHOD

2.1. Research design

Figure 1 shows the summary of the data collection process. Prior to the treatment, participants from both MOOC and video conferencing groups completed a pre-treatment descriptive writing task. In addition, they responded to a pre-treatment VLSs questionnaire, which was based on Gu [23] VLS questionnaire for ESL students.

The VLSs MOOC was set up on OpenLearning.com using the instructional frameworks proposed by Chamot *et al.* [24] and Macaro [25]. The MOOC group received the VLSs instruction over a 5-week period, in which 50 MOOC participants who completed the VLSs course on OpenLearning.com were taken in as participants. There were five modules in total: context clues, word formation, dictionary skills, mnemonics and metacognitive strategies. The course ended with a review section that consists of a quiz and an enrichment activity. Each module comprised a video of the lesson taught by the researcher. Learners were also exposed to targeted words for intermediate level up to pre-advanced level, as well as academic words from academic word list (AWL) [26]. In addition, practices, online quizzes, forums and online games were also part of the activities in the VLSs MOOC.

For the video conferencing group, the 44 participants were also taught similar modules over 5-weeks, but lessons were conducted synchronously with the researcher via Microsoft Teams. While the contents, exercises and target words were almost similar to the MOOC group, video conferencing participants also completed activities using Kahoot! and Google Jamboard, together with the researcher and other learners synchronously. Upon completion of the VLSs course, both groups answered the VLSs questionnaire again. They also completed a post-treatment descriptive writing task.

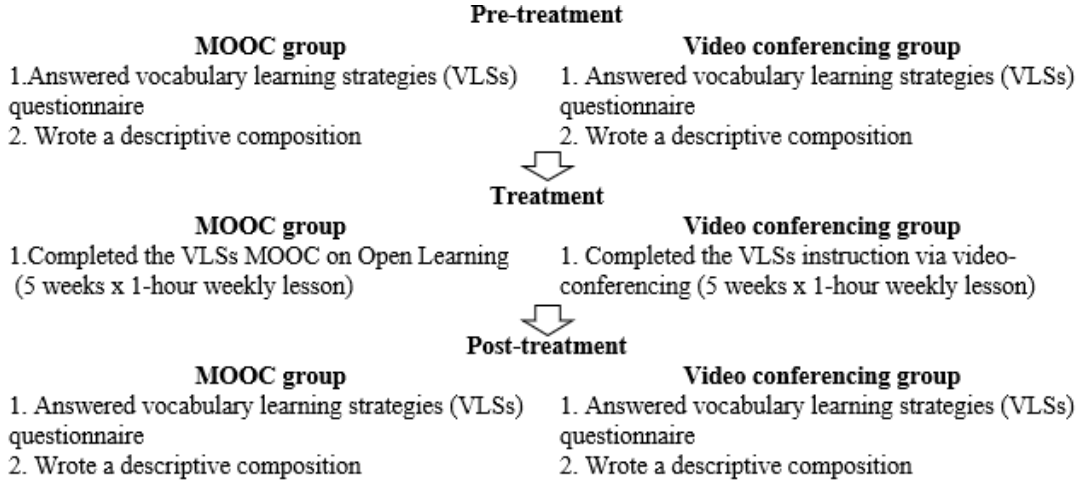

Figure 1. A summary of the data collection procedure

2.2. Participants

The participants comprised 94 undergraduate students, majoring in sciences and arts and humanities. They were enrolled in a pre-intermediate English language proficiency course and given the options to enroll in any class of their preference. Upon enrolling, they were then randomly assigned into MOOC and video conferencing groups.

2.3. Data instrument

2.3.1. VLSs questionnaire

Gu [23] VLSs questionnaire for ESL learners was adopted in this study to measure participants' use of VLSs before and after treatment. This questionnaire, based on Gu [27] taxonomy is an updated, validated, and published version, specifically for ESL learners. This questionnaire consists of 62 items with two main parts: metacognitive component (beliefs about vocabulary learning and metacognitive strategies) and cognitive component (guessing, dictionary use, note-taking, rehearsing and encoding). The metacognitive component utilizes a 7-point Likert scale from 1 (absolutely disagree) to 7 (absolutely agree) while the cognitive component uses a scale from 1 (extremely untrue of me) to 7 (extremely true of me).

2.3.2. Writing task

Prior to the start of the VLSs course, both MOOC and video conferencing students wrote a descriptive composition of about 180 to 200 words. Participants were given one week to complete the writing task "My favorite dish". Upon completion of the VLSs course, both groups completed another descriptive writing task on "My favorite place". The rationale of choosing topics with related content is to facilitate effective and efficient teaching and learning experiences. It also allows teachers and learners to capitalize on the interconnectedness of ideas and concepts.

2.4. Data analysis

The data from the questionnaire was analyzed using descriptive and inferential statistics in SPSS version 23. In addition, the participants' vocabulary in the writing task was analyzed using vocabulary profilers, which is accessible on Cobb [28] website, the Compleat Lextutor. This tool was utilized as its categorization of the word lists is according to the scoring in lexical frequency profile (LFP) used by Laufer and Nation [29], which has been found to have validity standards in a wide range of studies [30], [31]. Laufer and Nation [29] suggested two different ways of measuring the frequency of learners' text; one for less proficient learners and another for advanced learners. Less proficiency learners are likely to employ commonly used words than the advanced learners, hence their frequency of words used should be measured between the first 1,000 (K1) most frequently used words, the second 1,000 (K2) and other vocabulary. For students who are more proficient, their frequency of words used should also be measured using the AWL by Coxhead [26]. The last band should be words that are not in the above lists (off-list). The data from each composition produced by LexTutor was then entered into SPSS for further analysis.

3. RESULTS AND DISCUSSION

3.1. The effects of VLS instruction on ESL learners' use of VLSs in the MOOC and video conferencing groups

A paired samples *t*-test was conducted to find out the impacts of VLSs instruction on learners' use of VLSs via MOOC and video conferencing. The data of each category in the pre-test and post-test scores are in the range of -1.96 and +1.96, and they meet the assumption of normality for the paired-samples t-test. Outliers were detected and removed from the analysis.

For the MOOC group, there was a significant increase in all categories of the reported use of VLSs after the treatment as shown in Table 1; beliefs (t=3.17, p<.05), metacognitive strategies (t=5.04, p<.05), inferencing (t=5.38, p<.05), using dictionary (t=3.12, p<.05), taking notes (t=3.42, p<.05), rehearsal (t=7.63, p<.05), encoding (t=4.80, p<.05), and activation (t=4.63, p<.05).

Table 1. Paired sample *t*-test for the MOOC group on reported use of VLSs

MOOC	n	*M*	*SD*	*df*	*t*	Sig.(2-tailed)
Beliefs about vocabulary learning						
– Pre-treatment	49	55.14	6.07	48	3.17	.00 (Sig.)
– Post-treatment		58.22	7.20			
Metacognitive strategies						
– Pre-treatment	49	29.39	3.60	48	5.04	.00 (Sig.)
– Post-treatment		32.29	3.71			
Inferencing						
– Pre-treatment	50	37.38	5.74	49	5.38	.00 (Sig.)
– Post-treatment		40.76	5.53			
Using dictionary						
– Pre-treatment	50	40.38	5.86	49	3.12	.00 (Sig.)
– Post-treatment		42.46	4.84			
Taking notes						
– Pre-treatment	49	29.59	7.55	48	3.42	.00 (Sig.)
– Post-treatment		32.96	5.53			
Rehearsal						
– Pre-treatment	50	40.38	8.44	49	7.63	.00 (Sig.)
– Post-treatment		46.92	8.01			
Encoding						
– Pre-treatment	50	54.58	12.21	49	4.80	.00 (Sig.)
– Post-treatment		63.36	11.80			
Activation						
– Pre-treatment	50	20.50	4.18	49	4.63	.00 (Sig.)
– Post-treatment		22.86	3.84			

Likewise, for the video conferencing group, there was also a significant increase in all categories of reported use of VLSs after the treatment. The results are shown in Table 2: beliefs about vocabulary learning (t=4.08, p<.05), metacognitive strategies (t=2.03, p<.05), inferencing (t=6.71, p<.05), using dictionary (t=3.26, p<.05), taking notes (t=5.34, p<.05), rehearsal (t=7.08, p<.05), encoding (t=7.27, p<.05), and activation (t=4.65, p<.05). Both modes of VLSs instructions are shown to be equally effective in improving all the strategy use among the learners in the video conferencing group.

Table 2. Paired sample *t*-test for video conferencing group on reported use of VLSs

Video conferencing	n	*M*	*SD*	*df*	*t*	Sig. (2-tailed)
Beliefs about vocabulary learning						
– Pre-treatment	43	55.44	7.10	42	4.08	.00 (Sig.)
– Post-treatment		59.21	6.24			
Metacognitive strategies						
– Pre-treatment	41	31.56	4.03	40	2.03	.00 (Sig.)
– Post-treatment		33.95	5.71			
Inferencing						
– Pre-treatment	44	36.73	5.09	43	6.71	.00 (Sig.)
– Post-treatment		41.77	4.81			
Using dictionary						
– Pre-treatment	44	39.55	5.61	43	3.26	.00 (Sig.)
– Post-treatment		42.11	5.36			
Taking notes						
– Pre-treatment	42	30.14	5.67	41	5.34	.00 (Sig.)
– Post-treatment		34.62	5.17			
Rehearsal						
– Pre-treatment	44	41.07	7.27	43	7.08	.00 (Sig.)
– Post-treatment		48.32	8.17			
Encoding						
– Pre-treatment	44	55.61	10.53	43	7.27	.00 (Sig.)
– Post-treatment		66.57	10.75			
Activation						
– Pre-treatment	44	20.82	3.49	43	4.65	.00 (Sig.)
– Post-treatment		23.43	3.18			

Additionally, the analysis of covariance (ANCOVA) was used to investigate any differences between the MOOC and video conferencing groups on the categories of the VLSs. This data analysis method was used to adjust and control the pre-existing differences between the groups' reported use of VLSs, which were found to be statistically different before the study. Prior to proceeding with the main ANCOVA analyses, preliminary assumptions of the test were checked for normality and homogeneity of variances. Table 3 shows that there were no significant differences between the MOOC and video conferencing groups in the use of all VLSs in the post-treatment.

In each of the categories examined, the beliefs about vocabulary learning was not significantly different between the two groups, F(1, 89)=.46, p>.05, partial eta squared, η^2=.01, nor was metacognitive strategies, F(1, 87)=.21, p>.05, partial eta squared, η^2=.01. The difference between the MOOC and video conferencing groups in the other categories were also found not to be significant; inferencing F(1, 91)=2.64, p>.05, partial eta squared, η^2=.03, using dictionary F(1, 91)=.01, p>.05, partial eta squared, η^2=.00, and taking notes F(1, 88)=2.12, p>.05, partial eta squared, η^2=.02. Similarly, there was no significant difference between the two groups in rehearsal F(1, 91)=.56, p>.05, partial eta squared, η^2=.01, encoding F(1, 91)=1.73, p>.05, partial eta squared, η^2=.02 and activation F(1, 91)=.45, p>.05, partial eta squared, η^2=.01. In addition, the partial eta square ($\eta 2$), which is to measure the effect size, was found to be small in all categories. This also means the differences between the two groups are small. As both MOOC and video conferencing groups showed a significant increase in all the strategies used after the treatment (as shown in Table 1 and Table 2); as a result, there were no significant differences in the use of all VLSs in the post-treatment between the MOOC and video conferencing groups (Table 3).

The findings of this study revealed that the VLSs instruction via MOOC and video conferencing had a significant effect on advocating the use of VLSs in all categories for both groups. The first plausible explanation is participants in both MOOCs and video conferencing groups may be unaware of a variety of existing VLSs prior to the instruction. The significant increase frequency of strategy use could be due to participants realizing that there are alternative strategies that could be employed in their vocabulary learning.

Secondly, both MOOCs and video conferencing groups could have recognized the value and significance of the strategies to which they were exposed. Through the activities, they attempted to apply

them in contexts. In inferencing strategy, for example, they tried to identify the parts of speech of new words while predicting their meanings. It aided them in determining the meaning of an unknown word by identifying its part of speech. Participants could have benefitted from using this strategy, as this is likely to have contributed to the reported increase in usage of VLSs.

Table 3. ANCOVA comparison of MOOC and video conferencing learners' use of vocabulary strategies before and after treatment

		Sum of squares	*df*	Mean square	*F*	Sig.	Partial eta squared
Beliefs about vocabulary learning*	Between groups	15.45	1	15.45	.46	.50	.01
	Within groups	2965.58	89	33.32			
Metacognitive Strategies**	Between groups	4.33	1	4.33	.21	.21	.01
	Within groups	1811.18	87	20.82			
Inferencing	Between groups	45.28	1	45.28	2.64	.11	.03
	Within groups	1562.16	91	17.17			
Using dictionary	Between groups	.18	1	.18	.01	.92	.00
	Within groups	1563.41	91	17.18			
Taking notes***	Between groups	47.27	1	47.27	2.12	.15	.02
	Within groups	1960.68	88	22.28			
Rehearsal	Between groups	19.80	1	19.80	.56	.46	.01
	Within groups	3244.49	91	35.65			
Encoding	Between groups	173.01	1	173.01	1.73	.19	.02
	Within groups	9122.36	91	100.25			
Activation	Between groups	4.16	1	4.16	.45	.51	.01
	Within groups	850.99	91	9.35			

*MOOC (n=49), video conferencing (n=43), ** MOOC (n=49), video conferencing (n=41), *** MOOC (n=49), video conferencing (n=42)

In general, most participants found the strategies to be helpful in gaining more vocabulary. The findings of the study primarily revealed that technologically-assisted VLSs instruction had a significant impact on promoting language learners to use VLSs, which are consistent with earlier studies by Rahimi and Allahyari [10], Wu *et al.* [12] and Li [14]. These studies demonstrated that technology-based VLSs instruction is effective in increasing language learners' use of VLSs. In Rahimi and Allahyari [10] study, for example, compared the results of VLSs instruction between an experimental group that received multimedia-assisted explicit VLSs instruction and a control group that was given conventional classroom VLSs instruction. The results revealed that the experimental group used cognitive and memory strategies more significantly after the VLSs instruction. Hence, technology-based VLSs education can improve the effectiveness of teaching VLSs. It has the potential to positively impact learners' strategy use [10].

Besides Rahimi and Allahyari [10] findings, this study also corroborates with Mizumoto and Takeuchi [32] findings on explicit VLSs with Japanese undergraduate students. It was discovered in their study that ten weeks of VLSs instruction increased intrinsic motivation and frequency of usage among learners with low and intermediate proficiency levels. Similar to this study, both MOOC and video conferencing participants are pre-intermediate users of English. This indicates that learners with lower proficiency levels are likely to gain from VLSs instruction in terms of increased strategy usage.

VLSs instruction via traditional classes have generally proven in the past to be effective for students' vocabulary learning and have resulted in increase of strategy use [32], [33]. However, in comparative studies on a technology-based VLSs instruction versus traditional instruction, the former has shown to have more positive effects on learners' vocabulary learning [11]-[13]. This possibly means explicit vocabulary learning instructions are generally beneficial to learners but technology-based VLSs instruction tends to be more positively related to learners' vocabulary learning and strategy use. This also can be seen through the results of the MOOC and video conferencing groups. This further demonstrates that learners should be guided or trained to use strategies while learning languages, as knowing how to use the strategies may not occur automatically in this digital age. Hence, it is essential to train ESL learners in this aspect, particularly given that online learning is widely used in present times.

Both MOOC and video conferencing groups have shown a higher reported usage of VLSs post-treatment. Hence, in comparison between both groups' results, the ANCOVA results revealed no significant difference in reported strategy usage between the groups. Both modes of VLSs instruction are technology-based, offering interactive activities, and avenues for discussions. However, MOOC provides more flexibility; allowing learners to study VLSs at their own pace and time, watch the recordings as needed and engage via discussion boards. It caters to individual learning styles and allows learners to be in control of their learning.

Although video conferencing offers learners real-time communication, this does not seem to be an important factor in assisting learners to use more strategies at the end of the course in comparison to the MOOC group. This study has shown that learners have benefitted from receiving technology-based VLSs instruction, irrespective of the technological mode that the VLSs instruction was given; asynchronously and synchronously.

3.2. The effects of VLS instruction on ESL learners' vocabulary usage in writing in the MOOC and video conferencing groups

A paired samples *t*-test was also conducted to examine the impacts of VLSs instruction on the MOOC and video conferencing participants' descriptive writing. The data of each category in the pre-test and post-test scores are in the range of -1.96 and +1.96, and they meet the assumption of normality for the paired-samples *t*-test. Outliers were also detected and removed from the analysis.

For the MOOC group, Table 4 displays the paired sample *t*-test of the lexical frequency profile (LFP) on pre-treatment and post-treatment descriptive writing. The results showed a significant increase in the percentage of word tokens (total number of words) in the first 1,000 most frequently used words, K1 level (t=9.82, p<.05) and words from AWL (t=5.69, p<.05) after the treatment. On the other hand, the second 1,000 most frequently used words, K2 level (t=7.90, p<.05) and off-list category (t=7.37, p<.05) demonstrated a significant decrease in descriptive writing.

For the video conferencing group, Table 5 presents the paired sample *t*-test of LFP on pre-treatment and post-treatment descriptive writing. Similar to the MOOC group, the results also showed a significant increase of percentage in word tokens in K1 words level (t=10.25, p<.05) and AWL (t=6.20, p<.05) after the treatment. In K2 words level (t=11.46, p<.05) and off-list category (t=8.76, p<.05), the results revealed a significant decrease of percentage in descriptive writing.

Table 4. Paired samples *t*-test for MOOC group's word tokens used (in percentage) in descriptive writing based on lexical frequency profile

Frequency levels	MOOC group descriptive writing					
	n	*M*	*SD*	*df*	*t*	Sig.
K1 words (first 1,000)						
– Pre-treatment	50	75.03	4.94	49	9.82	.00 (Sig.)
– Post-treatment		83.28	4.48			
K2 words (second 1,000)						
– Pre-treatment	50	11.63	3.66	49	-7.90	.00 (Sig.)
– Post-treatment		6.43	2.64			
AWL words						
– Pre-treatment	47	1.33	0.98	46	5.69	.00 (Sig.)
– Post-treatment		2.65	1.22			
Off-List words						
– Pre-treatment	44	11.53	4.27	43	-7.37	.00 (Sig.)
– Post-treatment		6.53	2.49			

Table 5. Paired samples *t*-test for video conferencing group's word tokens used (in percentage) in descriptive writing based on lexical frequency profile

Frequency levels	Video conferencing descriptive writing					
	n	*M*	*SD*	*df*	*t*	Sig.
K1 words (first 1,000)						
– Pre-treatment	44	73.97	4.90	43	10.25	.00 (Sig.)
– Post-treatment		83.93	5.47			
K2 words (second 1,000)						
– Pre-treatment	43	12.56	3.37	42	-11.46	.00 (Sig.)
– Post-treatment		5.99	2.53			
AWL words						
– Pre-treatment	39	1.20	0.86	38	6.20	.00 (Sig.)
– Post-treatment		2.59	1.38			
Off-list words						
– Pre-treatment	42	11.71	3.36	41	-8.76	.00 (Sig.)
– Post-treatment		6.86	3.74			

In addition, the analysis of covariance (ANCOVA) was conducted to investigate the causal relationship of the lexical frequency profile (LFP) between the pre-treatment and post-treatment vocabulary

usage of MOOC and video conferencing groups. Prior to proceeding with the main ANCOVA analyses, preliminary assumptions of the test were checked for normality and homogeneity of variances. In the descriptive writing, Table 6 shows there was no significant difference in the percentage of word tokens in the post-treatment between the MOOC and video conferencing groups' descriptive writing, K1 level $F(1, 91)=.77$, $p>.05$, partial eta squared, $\eta^2=.01$, K2 level $F(1, 90)=.74$, $p>.05$, partial eta squared, $\eta^2=.01$, AWL $F(1, 83)=.03$, $p>.05$, partial eta squared, $\eta^2=.00$ and off-list category $F(1, 84)=.19$, $p>.05$, partial eta squared, $\eta^2=.00$.

Table 6. ANCOVA comparison of MOOC and video conferencing learners' descriptive writing task before and after treatment

Descriptive writing Frequency levels		Sum of squares	*df*	Mean square	*F*	Sig.	Partial eta squared
K1 words	Between groups	18.21	1	18.21	.77	.38(NSig.)	.01
	Within groups	2161.86	91	23.76			
K2 words*	Between groups	5.01	1	5.01	.74	.39(NSig.)	.01
	Within groups	606.48	90	6.74			
AWL words**	Between groups	.04	1	.04	.03	.87(NSig.)	.00
	Within groups	138.81	83	1.67			
Off-list words***	Between groups	1.70	1	1.70	.19	.67(NSig.)	.00
	Within groups	745.55	83	8.98			

*MOOC (n=50), video conferencing (n=43)
**MOOC (n=47), video conferencing (n=39)
***MOOC (n=44), video conferencing (n=42)

As there was no statistically significant difference in the percentage of word tokens in the post-treatment between MOOC and video conferencing groups, this indicates that they performed rather similarly in descriptive writing at all levels of the lexical frequency profile: K1, K2, AWL, and off-list words categories. Both MOOC and video conferencing groups showed a significant increase in the percentage of the word tokens in the first 1,000 most frequent words (K1) level and AWL category after the treatment. However, the percentage of word tokens in the K2 level and off-list category was significantly reduced after the treatment for both groups.

One plausible explanation could be that learners made the conscious effort to include academic words from AWL in their post-treatment descriptive writing task after completing the course. Learners from both groups were taught AWL explicitly during the VLSs lessons and given tasks requiring the usage of academic words. This might have contributed to a significantly higher use of words tokens from AWL for both groups in post-treatment descriptive writing "My favorite place". For instance, academic words such as "environment", "located", "utilize", "appreciate", "resources" were used more frequently. These results show the impacts of the VLSs course might have had on participants' usage of academic words.

Another possible reason is the tasks may have affected the learners' vocabulary choice. The findings revealed that different tasks resulted in differing use of advanced words for both groups. These results confirmed the findings of Gregori-Signes and Clavel-Arroitia [34] study, which show that the specific word groups of vocabulary used by students were influenced by the tasks. The descriptive pre-treatment task, which required both groups to write about "My favorite dish" prior to the treatment, was found to have a higher use of K2 words and off-list words as compared to their post-treatment writing. For instance, both groups used more K2 words such as "tempting", "attract", "plenty" and "especially". The types of dishes such as "spaghetti" and "noodles" as well as ingredients like "ginger", "turmeric" and "cinnamon" are in the off-list category.

The post-treatment writing entitled "My favorite place" was found to have a significantly higher usage of K1 words. For instance, learners used a higher number of K1 words to describe what they normally observed in their favorite setting. A place like the beach required participants to use words such as "wind", "waves", "beauty" and "nature", which fall in the K1 level. Similarly, a room would require participants to use words like "sleep", "peace", "safe" and "alone", which are also K1 level words. Instead of describing their favorite place in greater depth, participants used more words from K1 level to describe what they saw, heard and did in their favorite place. They mainly used basic words and did not expand their use of vocabulary while describing the place.

Comparing the results from the MOOC and video conferencing groups, there are no significant differences in the LFP of both groups in descriptive writing after the treatment. This could be due to both groups revealed rather similar results; they had significant increase of K1 and AWL words and a significant decrease of K2 and off-list words for post-treatment descriptive writing.

Based on the results, it is evident that the VLSs instruction has promoted the use of strategies among MOOC and video conferencing ESL learners. The VLSs instruction might also have led students to use significantly higher words from the AWL after the treatment. Studies have also shown that strategy instruction has been effective in increasing learners' vocabulary size [32], [35]. However, the productive use of vocabulary in writing is still influenced by the task itself [5]. This necessitates learners to draw on different linguistic features and therefore, may require different linguistics skills [36]. The findings echoed what have been iterated by Laufer and Nation [29], who stated that there are various other factors that can influence lexical use in writing. They could include familiarity with the topics, writing ability, and communication purpose. This means that a change in topic, for example, could result in a significant shift in lexical use. Furthermore, participants may know the existing words or words that are more advanced but may not necessarily use those words in a specific task. This could also be determined by the topic and to some extent, the length required of the task.

4. CONCLUSION

This study has investigated the effects of MOOC and video conferencing deliveries on ESL learners' usage of vocabulary and learning strategies. The results have demonstrated the importance for students to receive training in VLSs in order to learn vocabulary more efficiently. Additionally, while the effects of VLSs instruction on vocabulary usage could be reflected in both groups' writing, the choice of words might have been influenced by the topics or task requirements.

While the findings have demonstrated the importance for students to receive training in VLSs, it is essential to acknowledge the limitation of the study. One main limitation is that the duration of the five-week instruction was relatively short. This limitation highlights the need for future studies to explore long-term effects of online VLSs instruction on vocabulary usage in writing as they could have provided more insights.

The findings also provide some pedagogical implications. Firstly, teachers should design materials that focus on the output of the targeted vocabulary to assist learners to expand their vocabulary. The measurement of the learners' productive vocabulary could give teachers indication of the vocabulary that learners often use and need to be more exposed to. Learners who often use high frequently words in their writing should be encouraged and challenged to use more target words from the lower frequency vocabulary. Furthermore, learners should be advised to refrain from using similar words in their tasks. They should also make use of the available technological tools to make their vocabulary more diverse. This would assist learners to plan, monitor, evaluate and regulate their own vocabulary learning. Over the long run, it is hoped that learners can be more in control of their own vocabulary learning, and to be more self-autonomous, which is a necessary skill in this digital learning age.

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REFERENCES

[1] I. S. P. Nation, *Teaching and learning vocabulary*, New York: Newbury House, 1990.
[2] I. S. P. Nation, *Learning vocabulary in another language*, Cambridge: Cambridge University Press, 2001.
[3] N. Schmitt, "Vocabulary learning strategies," *Vocabulary: Description, Acquisition and Pedagogy*, Eds., Cambridge: Cambridge University Press, 1997.
[4] N. Schmitt, *Vocabulary in language teaching*, UK: Cambridge University Press, 2000.
[5] J. Read, *Assessing vocabulary*, UK: Cambridge University Press, 2000.
[6] R. L. Oxford, *Language learning strategies: what every teacher should know*, New York: Newbury House Publishers, 1990.
[7] R. L. Oxford, *Teaching and researching language learning strategies: self-regulation in context*, New York: Routledge, 2016.
[8] A. U. Chamot, "Language learning strategy instruction: current issues and research," *Annual Review of Applied Linguistics*, vol. 25, pp. 112–130, Mar. 2005, doi: 10.1017/S0267190505000061.
[9] P. Y. Gu, "Strategies for learning vocabulary," *The Routledge Handbook of Vocabulary Studies*, pp. 271–287, 2019, doi: 10.4324/9780429291586-18.
[10] M. Rahimi and A. Allahyari, "Effects of multimedia learning combined with strategy-based instruction on vocabulary learning and strategy use," *SAGE Open*, vol. 9, no. 2, Apr. 2019, doi: 10.1177/2158244019844081.
[11] F. Gay, "Investigating the effects of technology-enhanced vocabulary learning strategy instruction on supporting mixed-ability EMI learners studying a journalism and communication major: an action research project at a university in China," *Journal of English for Academic Purposes*, vol. 55, p. 101068, Jan. 2022, doi: 10.1016/j.jeap.2021.101068.
[12] W. C. V. Wu, J. S. C. Hsieh, and J. C. Yang, "Creating an online learning community in a flipped classroom to enhance EFL learners' oral proficiency," *Educational Technology and Society*, vol. 20, no. 2, pp. 142–157, 2017, doi: 10.30191/ETS.201704_20(2).0012.
[13] F. Kiliçkaya and J. Krajka, "Comparative usefulness of online and traditional vocabulary learning.," *Turkish Online Journal of Educational Technology*, vol. 9, no. 2, pp. 55–63, 2010.

[14] J. Li, "The evolution of vocabulary learning strategies in a computer-mediated reading environment," *CALICO Journal*, vol. 27, no. 1, pp. 118–146, Sep. 2010, doi: 10.11139/cj.27.1.118-146.
[15] V. Stevens, "What's with the MOOCs?," *The Electronic Journal for English as a Second Language*, vol. 16, no. 4, pp. 1–14, 2013.
[16] Z. Bárkányi, "Can you teach me to speak? Oral practice and anxiety in a language MOOC," *Innovative language teaching and learning at university: integrating informal learning into formal language education*, pp. 9–16, 2018, doi: 10.14705/rpnet.2018.22.771.
[17] B. Gilliland, A. Oyama, and P. Stacey, "Second language writing in a MOOC: affordances and missed opportunities.," *The Electronic Journal for English as a Second Language (TESL-EJ)*, vol. 22, no. 1, pp. 1–25, 2018.
[18] E. Martín-Monje, E. Bárcena, and P. Ventura, "Peer-to-peer interaction in professional English MOOCs: a proposal for effective feedback," *Proceedings of The European Conference on Language Learning*, 2013.
[19] A. A. Vorobyeva, "Language acquisition through massive open online courses (MOOCs): opportunities and restrictions in educational university environment," *XLinguae*, vol. 11, no. 2, pp. 136–146, 2018, doi: 10.18355/XL.2018.11.02.11.
[20] A. P. Correia, C. Liu, and F. Xu, "Evaluating videoconferencing systems for the quality of the educational experience," *Distance Education*, vol. 41, no. 4, pp. 429–452, Oct. 2020, doi: 10.1080/01587919.2020.1821607.
[21] C. A. Lenkaitis, "Technology as a mediating tool: videoconferencing, L2 learning, and learner autonomy," *Computer Assisted Language Learning*, vol. 33, no. 5–6, pp. 483–509, Jul. 2020, doi: 10.1080/09588221.2019.1572018.
[22] Y. Zhou and M. Wei, "Strategies in technology-enhanced language learning," *Studies in Second Language Learning and Teaching*, vol. 8, no. 2 Special Issue, pp. 471–495, Jul. 2018, doi: 10.14746/ssllt.2018.8.2.13.
[23] P. Y. Gu, "Validation of an online questionnaire of vocabulary learning strategies for ESL learners," *Studies in Second Language Learning and Teaching*, vol. 8, no. 2 Special Issue, pp. 325–350, Jul. 2018, doi: 10.14746/ssllt.2018.8.2.7.
[24] C. Dicker, A. U. Chamot, and J. M. O'Malley, "The CALLA Handbook: implementing the cognitive academic language learning approach," *TESOL Quarterly*, vol. 28, no. 3, p. 647, 1994, doi: 10.2307/3587323.
[25] E. Macaro, *Learning strategies in Foreign and Second Language Classrooms*, London: Continuum, 2001.
[26] A. Coxhead, "A New Academic Word List," *TESOL Quarterly*, vol. 34, no. 2, p. 213, 2000, doi: 10.2307/3587951.
[27] Y. Gu, "Vocabulary Learning Strategies," *The Encyclopedia of Applied Linguistics*, C. A. Chapelle, Ed., Hoboken, NJ: Blackwell Publishing, pp. 1-6, 2013.
[28] T. Cobb, "Web VP classic," 2022, [Online]. Available: http://www.lextutor.ca/vp.
[29] B. Laufer and P. Nation, "Vocabulary size and use: Lexical richness in L2 written production," *Applied Linguistics*, vol. 16, no. 3, pp. 307–322, Sep. 1995, doi: 10.1093/applin/16.3.307.
[30] B. Laufer and P. Nation, "A vocabulary-size test of controlled productive ability," *Language Testing*, vol. 16, no. 1, pp. 33–51, 1999, doi: 10.1177/026553229901600103.
[31] B. Laufer and T. S. Paribakht, "The relationship between passive and active vocabularies: effects of language learning context," *Language Learning*, vol. 48, no. 3, pp. 365–391, Sep. 1998, doi: 10.1111/0023-8333.00046.
[32] A. Mizumoto and O. Takeuchi, "Examining the effectiveness of explicit instruction of vocabulary learning strategies with Japanese EFL university students," *Language Teaching Research*, vol. 13, no. 4, pp. 425–449, 2009, doi: 10.1177/1362168809341511.
[33] K. M. Chiang, C. H. Chang, and I. Lee, "Vocabulary learning strategy instruction in the EFL secondary classroom: an exploratory study," *Language Awareness*, vol. 32, no. 1, pp. 94–113, Jan. 2023, doi: 10.1080/09658416.2021.1979566.
[34] C. Gregori-Signes and B. Clavel-Arroitia, "Analysing lexical density and lexical diversity in university students' written discourse," *Procedia - Social and Behavioral Sciences*, vol. 198, pp. 546–556, Jul. 2015, doi: 10.1016/j.sbspro.2015.07.477.
[35] Y. Gu and R. K. Johnson, "Vocabulary learning strategies and language learning outcomes," *Language Learning*, vol. 46, no. 4, pp. 643–679, Dec. 1996, doi: 10.1111/j.1467-1770.1996.tb01355.x.
[36] S. Crossley, "Linguistic features in writing quality and development: an overview," *Journal of Writing Research*, vol. 11, no. 3, pp. 415–443, Feb. 2020, doi: 10.17239/JOWR-2020.11.03.01.

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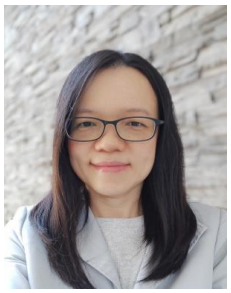

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