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Applying self-regulation and smartphones to assist college English-majors in learning academic vocabulary for writing out of the class

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1. Research Motive and Purpose 研究動機與目的

"Generations Z (ages 10-24) and Alpha (ages 0-9) were born into a world where algorithms keep them clicking, scrolling and swiping at a frenetic pace," as noted by Mancall-Bitel (2019/2/19). In the same article of BBC news, Mancall-Bitel concludes by citing experts' suggestions that blended learning of in-class instruction and out-of-class learning with smartphones (MALL) may work better (Kukulska-Hulme, Lee, & Norris, 2017), and learning to think creatively and critically are educators' top priority in teaching our new generations. With the proliferation of cell phones, digital technologies and high-speed Internet connection, today's students (the App generation, Gardner & Davis, 2013) prefer to seek immediate solutions to their learning needs (Lai & Zheng, 2018; Nunan & Richards, 2015) with ideally learning both in-class/in person and beyond the classroom (Reinders & Bensen, 2017). Smartphones provide such digital devices to facilitate English learning and teaching in Taiwan (EFL, English-as-a-Foreign-Language) anywhere at any time. Students may be much heavily addicted to smartphone use so they are distracted to its coming messages or content while the classroom English teachers focus on other important course content. For out-of-class MALL, another serious problem is lack of self-directed learning management or self-regulated learning skills (Garcia-Botero et al. in press; Gardner & Davis, 2013; Green, 2019). This study addressed whether using self-regulated strategies and the teacher's in-class scaffolding can help college students to learn academic English vocabulary using smartphones out of the class in order to apply the vocabulary in their writing.

2. Literature Review 文獻探討

Self regulation and regulatory strategy use. Being a very important topic in educational psychology, self-regulated (SR) learning includes "the cognitive, metacognitive, behavioral, motivational, and emotional/affective aspects of learning" (Panadero, 2017, p. 1). After a review of six self-regulation (SR) learning models, Panadero maintains that SR learning (SRL) forms an integrative and coherent framework from which to conduct research and on which students can be taught to be more strategic and successful. Self-regulation, essential to lifelong learning and self-directed learning, means "to what extent students are able to regulate, that is, manage and organize, their learning process and in what ways they are capable of taking responsibility for their own learning" (Pintrich & De Groot 1990; Schunk & Zimmerman 2008, cited in Csizer & Tanko, 2017, p. 388).

In using technologies, particularly smartphones, to help English teaching, researchers just started to examine how SR can bring positive impact on learners. Recently, Kızıl and Savran (2018) validated a 23-item questionnaire of SR-based vocabulary learning using various digital tools. Based on the evidence of 293 college students' survey responses, learners with positive online learning experiences were shown to be more flexible and independent in their SRL process (Zheng et al., 2018).

Recent MALL studies. Chwo, Marek, and Wu (2018) reviewed how mobile devices could help language learning and suggested directions for instructional design. Lin and Lin (2019) meta-analyzed 33 studies on MALL for vocabulary learning and found the mobile functions of short message services and multimedia message services can both be helpful. Among very limited studies which examined how self-regulated strategies could bring impact on MALL, Kondo et al. (2012) and Garcia-Botero et al. (2019) adopted the same three phases and sub-processes of self-regulation (Zimmerman, 1998) in college contexts. Kondo and their colleagues (2012) examined how students maximized mobile devices to learn English. Designed with SR principles, a mobile module of 'Academic learning cycle phases' for TOEIC listening/reading

(Nintendo DS mobile device) resulted in the 88 Japanese students in the experimental group spending more time on self-study, and a higher level of motivation. As for continued use in the following semester, the results varied among different learners.

The three phases of their SR model (Garcia-Betero et al., 2019) include: forethought, performance, and self-reflection (see their Figure 1 on p. 6). The forethought phase includes goal setting and strategic planning; the performance phase includes self-observation and self-recording. The self-reflection phase, a crucial core of the model, consists of self-judgment, self-evaluation, and self-reaction. They recruited fifty-two students of French and divided them into one control and two experimental groups who used instructional materials on *Duolingo* (a smartphone Apps) in an out-of-class context. One experimental group was provided with self-regulation and scaffolding for their MALL. They found that the group with self-regulation and scaffolding outperformed the other two groups on their writing skills and participation.

Contextualized (single- & multi-word) **vocabulary learning via technologies.** Updating readers with emerging technological choices for contextualized vocabulary learning, Godwin-Jones (2018) maintains "contextualized encounters are likely to enhance the chances of retention, as words and expressions are used in meaningful, and therefore more memorable, ways" (p. 2). Studies addressed teaching either academic single-words (Lin & Liou, 2009) or academic multi-word units to college students for writing in Taiwan, and found positive effects from explicit instruction. Arguably, multi-word learning can assist college writing in reducing processing demand of combining single items into larger chunks. Studies demonstrated that explicit instruction of academic multi-word units can lead to more use of such phrases in students' essays.

The literature survey of self-regulation applied to English learning via smartphones indicates that there is much left unknown particularly when college instructors would attempt to apply them for teaching contextualized English vocabulary for writing to today's students who may be easily distracted using cell phones in class. Thus, the current action research study aimed to solve the App generation's English vocabulary learning problem when they used smartphones out of the class.

3. Research Question 研究問題

Linking informal online learning out of the class needs either a teacher's scaffolding or obtains incentives from an existing course structure. To learn about English writing is a taxing task even for English-major students due to its complexity and recursiveness. Few studies discuss their application to teaching English writing via cell phones. To fill the gap, this action research project examined whether academic vocabulary learning units designed on cell phones and used outside of the class can foster college students' use of those target words in essays by addressing the research questions:

(1) Can a blended design of out-of-class MALL and in-class writing practice lead to consolidation of academic vocabulary for writing via self-regulation?

(2) What are students' perceptions about the blended design and out-of-class pair-work in facilitating their vocabulary learning for writing?

The study initiates the first step by transforming our digital natives from being App-dependent to App-empowered in the realm of English writing.

4. Research Methodology 研究設計與方法

Participants. Twenty-four second-year college students who were English majors and taking a two-credit required writing course in a college (in the central part of Taiwan) served as participants of the project. They signed a consent form before they

joined the research. A blended design with both mobile-assisted vocabulary learning and traditional class activities was implemented in this required English writing course.

Treatment and instructional design. Scholars (Kukulska-Hulme et al., 2017; Kukulska-Hulme & Viberg, 2018; Stockwell & Hubbard, 2013) provide general principles of how MALL should be designed. They maintain MALL can be applied together with traditional pedagogy (Kukulska-Hulme et al., 2017) to both individual and collaborative learning (Kukulska-Hulme & Shield, 2008). Based on corpus evidence, Coxhead (2000) analyzed and established an Academic Word List (AWL)—570 word families divided into 10 sub-lists of different difficulty levels. AWL is helpful for improving students' comprehension of academic written texts, and has also become useful for developing vocabulary tests and dictionaries (Coxhead, 2016) as a well-known word list for teaching and learning English in college contexts. Content of the instructional treatment consisted of a target word list of 40 single-word items from AWL for our instruction and assessment, *Quizlet* as a cellphone apps serving as a delivery application, and in-class collaborative paragraph writing.

Target vocabulary list. A target word list with 60 items (see Appendix B for a sample) was selected as content to be designed using *Quizelet* in the current study. The vocabulary list was formed with 40 academic single-words from the AWL list (Coxhead, 2000, e.g. *access, commit*) and 20 collocations (grammatical or lexical types), extensions of half of the 40 academic words (e.g., *access to, commit oneself*). That is, not every academic word has an extended phrase.

Quizlet. Two prior studies (Andarab, 2019; Luo, 2020) demonstrated the usefulness of *Quizlet* (http://quizlet.com, Andrew Sutherland) for L2 learning. It is a free mobile and a web-based online learning system with eight different study modes for vocabulary: (a) Flashcards, (b) Learn, (c) Write, (d) Test, (e) Match, (f) Gravity, and (g) Live. Five of them can run both on the cell phones and desktop/laptop computers. Our treatment units were designed to operate using the mobile version with five study modes: (1) Flashcards, (2) Learn, (3) Write, (4) Test, and (5) Match. Students could use other study modes on the computers after classes.

Self regulation and scaffolding. The instructor's explanation of the importance of self-regulation for out-of-class academic vocabulary learning was given in class to all participants in week 1 of the semester. This merged what already existed in our institution under CDIO (conceive, design, implement, and operate, http://ctir.fcu.edu.tw), the self-regulation rubric (SR Rubric, also a students' self-assessed questionnaire items in Appendix D) and the SR literature. The designed self-regulation mechanisms are shown in Table 1, following the three phases in Zimmerman (1998): forethought, performance and self-reflection in a blended mode.

Table 1: Self-regulation mechanisms designed under 3 phases

		Website	App
A. Forethought phase			
Quizlet coach	Guides the student to reach his weekly goals.	✓	✓
Weekly reminder *Line* text message.	A reminder sent to complete a weekly lesson.	×	×
B. Performance phase			
Quizlet Memory bars	Shows when words need to be completed per session.	✓	✓
Pronunciation and repetition button	Allows learners to listen to English pronunciation of words and sentences.	✓	✓

Flashcards	Practices words learned.	✓	✓
Peer support	*Quizlet* collaborative units (pair-work)	✓	✓
C. Self-reflection phase			
Progress quiz	Measures language learning progress.	✓	✓
List of words learned	Includes the word, lexical category, date it was last practiced.	✓	✓

Research instruments. To assess the participants' vocabulary performance, three assessment tasks were given at the pretest, posttest, and delayed posttest stages. The 3 tasks were: (A) a shorter version of the passive knowledge test from the AWL (30 items, AWL-receptive, Nation, test A), (B) a 20-item test sampled from the taught/target academic word items in a sentence gap-filling format with the 40 target words (AWL-gf), and (C) an in-class writing task. The first instrument was a version of 30 words selected from the Academic Word List: Test A (Nation, see the complete version and answer keys from https://www.victoria.ac.nz/lals/about/staff/averil-coxhead, AWL-receptive test A). The second task was a 20-item academic word gap-filling test (AW-gf), where 20 (10 with their extended collocations) out of the 40 taught academic words (provided as choices) were tested in a sentence format with target words missing. The third task was a sixty-minute in-class writing task. Content of the two vocabulary tests were the same to be used in the pretest, posttest, and delayed posttest but their orders were made different from one another. The ratio of academic words in all student essays was obtained via *Vocabprofile* analysis (the classic version as it separates words from AWL as one independent category).

Two questionnaires were used in the posttest and the delayed posttest stages (translated into Chinese to avoid confusion). The first evaluation questionnaire (on MALL) consisted of items on a five-point Likert scale of agreement (5 = Strongly Agree, 4 =Agree, 3 = Undecided, 2 = Disagree, 1 = Strongly Disagree). The purpose of the questionnaire was to find out the participants' feelings about the designed treatments and out-of-class pair-work (14 items for the posttest stage, and 7 items for the delayed posttest stage). The second questionnaire (in a 4-point scale) was for students to assess themselves in terms of self-regulated behaviors on 3 dimensions (SR questionnaire): (1) overall performance (item 1-5), (2) during participation (item 6-9), and (3) after the weekly activities (item 10 and 11).

5.Teaching and Research Outcomes 教學暨研究成果

Teaching process, outcome and reflection. (教學過程與成果及教師教學反思) The Paired T-test was used to compare students' performance elicited in the pretest and posttest, as well as in the posttest and delayed posttest concerning our vocabulary test and AWL-receptive. Students' performance of the two tests at the pretest, posttest, and delayed posttest was compared using paired T-test. As indicated in Table 2, we found that students' posttest performance when compared with that elicited in the pretest was significantly different, which indicated they had improved due perhaps to the smartphone treatment on *Quizlet* units. Students' AWL-receptive scores improved from 70.00 to 76.07 (out of 100.00, t=-3.453, P<0.01), and the Vocabulary test improved from 48.00 to 56.63 (p<0.05, t=-2.618, p<0.01). When their delayed posttest performance of both tests was compared with that of their corresponding posttests, the progress from the pretest assessed in the beginning of the semester was maintained: no significant regression between the posttest and the delayed posttest (both p's >0.05).

Table 2. Results of two vocabulary tests at three time points

	Vocabulary-gap filling		AWL-receptive	
N=24	Mean	SD	Mean	SD
Pretest	48.00	17.44	70.00	16.13
Posttest	56.63	19.97	76.07	14.80
Delayed Posttest	52.58	22.82	79.18	14.90
	T	*p*	*t*	*p*
Pretest vs. Posttest	-2.618	<0.05	-3.453	<0.01
Posttest vs. Delayed Posttest	1.131	>0.05	-1.1832	>0.01

We also examined the proportion of academic words and their types which were used in students' writing across three time points. The results were consistent with those of the two vocabulary tests.

Table 3. Results of paired t-tests on AWL (%) and AWL Type at three time points

	AWL(%)		AWL Type	
N=24	Mean	SD	Mean	SD
Pretest	4.50	2.07	10.13	4.66
Posttest	7.22	2.68	14.33	5.93
Delayed Posttest	8.18	2.87	11.25	3.59
	T	*p*	*T*	*p*
Pretest vs. Posttest	-4.701	<0.05	-3.274	<0.01
Posttest vs. Delayed Posttest	-1.311	>0.05	2.591	>0.01

Rating of all the students' writing was conducted by a professor and an MA graduate student both with a background on English teaching with an inter-rater reliability of 0.81. T-test results of the students' writing quality as elicited at the three time points indicate the trends are like those of the two tests: significant improvement from the pretest (t=-4.303, p<0.01) and maintained as shown on the delayed posttest (see Table 4).

Table 4. Results of the writing task at three time points

N=24	Mean	SD
Pretest	65.52	5.82
Posttest	71.85	7.68
Delayed Posttest	72.23	5.86
	t	*P*
Pretest vs. Posttest	-4.303	<0.01
Posttest vs. Delayed Posttest	-0.268	>0.05

We further examined the students' use of academic word profiles in their texts by comparing their word ratios, word types, and the 40 target words at three time points. The use of academic words from the three dimensions, when we compared their pretest and posttest performance, all show significant differences, better in the posttest (all *p's*<0.05) as shown in Table 5ab.

Table 5a Word profiles at three time points

N=24	Pretest				Posttest		Delayed posttest	
Words of essay	**Total**	**Mean**	**Max.**	**Min.**	**Total**	**Mean**	**Total**	**Mean**
	6876	286.50	400	197	6080	253.33	6344	264.33
K1 (%)		80.66	87.62	75.46		83.91	/	80.01
K2 (%)		5.89	10.12	3.57		4.00	/	4.15
AWL (%)		4.50	9.75	0.00		7.22	/	8.18
Offlist (%)		8.91	14.70	3.73		4.87	/	7.90
AWL Type	243	10.13	23	0	344	14.33	270	11.25

Table 5b. Results of paired t-tests on AWL40 (type) and AWL40 (token) at three time points

	AWL40 (type)		AWL40 (token)	
N=24	Mean	SD	Mean	SD
Pretest	1.50	1.83	1.19	1.60
Posttest	2.38	1.11	3.00	1.83
Delayed Posttest	1.58	1.85	2.08	2.60
	t	*p*	*T*	*p*
Pretest vs. Posttest	-2.948	<0.05	-3.292	<0.01
Posttest vs. Delayed Posttest	1.983	>0.05	1.571	>0.01

Students' feedback. (學生學習回饋) The overall ratings of all items in the questionnaire were 3.89 (out of 5.00) in the posttest stage and 3.71 in the delayed posttest, both close to 4.00 (agree) in Table 6. We list top and bottom two to three items (according to rank orders of means) for contrast.

Table 6a students' feedback

Results of the posttest questionnaire on Quizlet units (N=24)			
Rank order	題目	Mean	SD
1	這個 APP (Quizlet) 讓我可隨時隨地使用並容易記住學術單字和搭配詞，幫助寫作。 Using Quizlet/the app made it easier to memorize useful academic words and collocations for writing anywhere any time I	4.17	0.69

	like.		
2	這個 APP 對於寫作上用到的學術單字和搭配詞學習是有用的。 The app is useful for learning academic words and collocations for writing.	4.13	0.83
2	這個 APP 幫助我提升學術單字和搭配詞的知識。 The app helped me improve my knowledge of academic words and collocations.	4.13	0.60
12	使用這個 APP 使我能夠更自主學習英語寫作。 Using this app can turn me into a more autonomous English learner-writer.	3.63	0.81
13	我喜歡在課堂上與我的同學一起學習寫作，因為這比獨自一人寫作更有效。 I like to learn with my partners out of class as it is more effective than learning alone.	3.54	1.12
13	使用這個 APP Quizlet 分組活動，讓我能更自主學習英語寫作。 Using this app (Quizlet part I and part II-pair work) can turn me into a more autonomous English learner-writer.	3.54	0.91

Table 6b. Students' feedback at the delayed posttest

Results of the delayed posttest questionnaire on Quizlet units (N=24)		
Rank Order	題目	Mean
1	使用這個 APP (Quizlet 單元及新增單字) 讓我更容易記住有幫助的學術單字和搭配詞 Using Quizlet units had helped me remember useful academic words/phrases more easily.	4.00
2	在 Quizlet 中分組複習學過單字對我很有幫助 During the three weeks, pair-work for review old words is helpful to me.	3.96
6	我喜歡在課後與我的同學一起學習，因為這比獨自一人學習更有效。 I like to learn with classmate(s) after class because this is more effective than learning alone.	3.50
7	在分組學習中，同學所增添的新學術單字/搭配詞，擴展我的詞彙量和幫助我學習。 To learn the new words added by classmate(s) expanded my vocabulary, which is helpful to learning.	3.38

In Table 7, we show the result of students' self-assessed self-regulation. They reached at least 3.21 (out of 4.00, 80%) over the project's duration in terms of overall performance, during participation, and after the weekly activities.

Table 7. Results of self-regulation

Questionnaire results of students' self-assessed self-regulation (N=24)				
Types	Overall performance (I)	During participation (II)	After the weekly activities (III)	All items
Posttest	3.40	3.51	3.35	3.41
Delayed posttest	3.32	3.30	3.21	3.29

Total: 4.00

Specifically, they seemed to become more focused and raise their confidence and self-efficacy as indicated in Table 8. For active participation and self-assessment, they did not rate as high (still over 80%). In Table 9, their SR had slight regression in the delayed posttest.

Table 8. Highest and lowest items

Results of the posttest questionnaire on students' self-assessed self-regulation (N=24)			
Rank Order	Types	Construct	Mean
1	During participation (II)	學習專注力 attention (focus on 10 words each week)	3.75
2	Overall performance (I)	自我效能與自信 self-efficacy (confidence in yourself on finishing Q tasks)	3.58
10	Overall performance (I)	主動參與的興趣 participation/interest	3.25
10	After the weekly activities (III)	自我評量 self-assessment (assess yourself; how well did you do)	3.25

Table 9 SR results of the delayed posttest

Results of the delayed posttest questionnaire on students' self-assessed self-regulation (N=24)			
Rank Order	Types	Construct	Mean
1	During participation (II)	學習專注力 attention (focus on 7 words each week)	3.42
1	During participation (II)	解決問題的策略 problem-solving (consult others if examples on quizlet aren't proper or enough)	3.42
10	During participation (II)	有效利用資源 use resources/Quizlet	3.17
10	After the weekly activities (III)	自我評量 self-assessment (assess yourself; how well did you do)	3.17

While Garcia-Botero et al. (2019) found positive results of self-regulation associated with MALL use in their experimental groups, they also found students rarely used self-regulation features in their MALL design and raised cautions for designers.

6. Recommendations and Reflections 建議與省思

Most students involved in this project have learned some self-regulated learning strategies in time and showed progress in the posttest, or became fully aware of the importance of self-regulation for their own learning on cell phones. They changed from being App-dependent to App-empowered (Gardner & Davis, 2013). Given clear documentation of how this MALL action research project was implemented in a college English writing context by highlighting SRL strategies, we can share with EFL

researchers and teachers how to help the App generation to learn English academic vocabulary by planning, monitoring, and evaluating their own progress along their learning trajectories. Teachers are informed specifically with steps of implementing SRL as well as scaffolding along the learning process. Given one-year frame, we presented initial findings of this project in an academic conference (April of 2021, Int'l conference on applied linguistics and language teaching, NTUST). Given more time, a journal article is expected to be published to share in the academic community.

Contribution to the community. Findings inform EFL researchers and teachers on how applications of self-regulated strategies and teachers' scaffolding can contribute to out-of-class academic vocabulary learning on cell phones in a blended format (plus in-class pair writing and extended out-of-class pair-work).

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