Learning Vocabulary Seamlessly: To What Extent Does the SLL Model Influence CFL Learners' Experience, Perception, and Vocabulary Enhancement?

Xiaosheng Zhou* and Ying Soon Goh

Abstract—The Seamless Language Learning (SLL) model holds the potential for enriching second language (L2) learners' vocabulary acquisition by focusing on their experiences and perceptions. However, prior research on SLL has suffered from methodological issues and poor understanding of the model. This study aims to address these issues by quantitatively assessing the impact of the SLL model on Chinese as a Foreign Language (CFL) learners' vocabulary acquisition experience, their perceived use of the DingTalk platform, and vocabulary learning enhancement. To achieve these objectives, a design-based research (DBR) approach is employed, with data gathered from real-world seamless Chinese vocabulary learning activities involving 32 intermediate-level participants with no prior exposure to SLL. Data analysis involves a paired sample t-test. Pre-test and post-test assessments, using a five-point Likert scale, are conducted to gauge the effectiveness of the SLL model. The assessment tool, the Seamless Chinese Vocabulary Learning Questionnaire (SCVLQ), encompasses various dimensions such as participants' emotional engagement, satisfaction, interaction with SLL, perceptions of the SLL platform (DingTalk), and vocabulary learning enhancement through the utilization of the SLL model. Empirical results from valid SCVLQ responses indicate significant post-test improvements compared to pre-tests, indicating enhanced learner experiences and perceptions. Moreover, the SLL model is found to positively contribute to vocabulary learning enhancement. These findings provide quantitative support, addressing the limitations of previous qualitative approaches, and confirming the efficacy of the SLL model in promoting active learning engagement, enhancing learners' experiences with the DingTalk platform, and facilitating vocabulary acquisition. This study offers insights for future research to delve into additional factors influencing the SLL model's effectiveness and to extend its application to diverse language learning contexts.

Index Terms—Seamless Language Learning (SLL), vocabulary learning experience, DingTalk platform, learning enhancement

I. INTRODUCTION

Language learning theorists [1, 2] have become increasingly conscious of the limitations inherent to classroom-only language learning. The de-contextualization of learning material and processes, as well as a lack of self-directed learning and authentic social interactions comprise the main criticisms of classroom-only language learning [3, 4]. These issues have been identified as impediments to learners' overall language development, particularly in their competency and confidence in real-life L2 interactions. To overcome these pedagogical limitations, enhancing language learning opportunities necessitates special attention to the aspects that form the foundation of language. One of these aspects is vocabulary learning and acquisition. Vocabulary, as a key component of any language, has become an area of research focus, especially in the search for techniques that can facilitate learner gain [5, 6]. Despite the importance of vocabulary acquisition, in terms of Chinese language pedagogy, research has found students report Chinese vocabulary learning activities to be boring (that is, in formal classroom learning contexts); moreover, the majority of Chinese as a Foreign Language (CFL) learners spent less time practicing Chinese vocabulary outside of the classroom [2, 3, 5]. Influential factors that could lead to this disappointing situation include the excessively dominant "teacher-centric" position, the students' lack of self-directed learning, the fact that vocabulary learning tasks are often considered (potentially due to poor task design) boring [4], and others. Hence, there is a pressing need to investigate and develop different approaches, overcoming these issues in order to facilitate effective language learning—especially in vocabulary acquisition. In an attempt to respond to this need, Seamless Language Learning (SLL) [4, 7] has been examined as a means of addressing the limitations of classroom-only language learning. SLL is an emerging model that focuses on linking language learning activities that occur in diverse learning environments, from classroom discussions to real-life L2 encounters. The model aims to promote meaning making and idea sharing in the target language by facilitating social interactions, often via social media, in authentic learning contexts. For example, Lan and Lin [8] developed the MobileMan (Mobile Mandarin learning platform) which aims to evaluate L2 Chinese Mandarin students' communicative vocabulary and situational vocabulary acquisition on a seamless platform. Within this seamless learning context, students are required to explore the campus, thereby compelling students to use the target vocabulary given. Although the process of seamless Chinese learning course just lasted six weeks, the overseas Chinese students were found to have benefited from seamless learning in connecting (via vocabulary) the gaps between inside and outside the classroom learning. Likewise, as stated by Wong *et al.* [4], through the provision of more contextualized learning materials in the MyCLOUD platform, students become more active in applying what they have learned to their daily lives. Despite the emergence of

empirical studies investigating the impact of SLL and the integration of seamless learning in the L2 area (predominantly utilizing qualitative research methods) [5, 9], few researchers have explicitly examined the role of learners' own learning experiences, the use of a digital learning platform, and vocabulary learning acquisition in SLL contexts. In particular, quantitative evidence for the effectiveness of the SLL model on enhancing Chinese vocabulary acquisition remains scarce. This is an important gap, given that the likelihood of success in any learning activity is largely determined by the students' learning experiences, affectivity, satisfaction, and perceptions. To contribute to filling this pertinent research gap, a Seamless Chinese Vocabulary Learning Questionnaire (SCVLQ) was employed to examine the effectiveness of the SLL model. To facilitate this investigation, the following three research questions were proposed:

1) To what extent does the SLL model influence CFL learners' vocabulary learning experiences?
2) To what extent does the SLL model influence CFL learners' perceptions of the DingTalk platform?
3) How do CFL learners perceive the impact of the SLL model on their vocabulary learning enhancement?

This paper reports the research work based on the hypothesis that the use of the SLL model has a significant positive influence on learners' experiences of vocabulary learning, perception towards the use of SLL platforms (specifically Ding Talk), and vocabulary enhancement (i.e., the improvement or growth of learner's vocabulary knowledge and usage over time).

II. LITERATURE REVIEW

The widespread availability of digital technology has expanded one-to-one language learning practices outside of the classroom. In so doing, digital technologies have enabled the creation of authentic contexts for learners' L2 practice and vocabulary acquisition [10]. Seamless learning is an emerging pedagogical concept or approach that refers to a language student experiencing a continuity of learning across a combination of locations, times, technologies or social settings, and consciously connecting such multifaceted and multi-modal learning efforts to achieve deeper learning [11–13]. The main purpose of seamless learning is to enable learners to establish their propensity, ability and habit towards autonomous learning, and eventually to become lifelong learners. In this vein, Wong and Looi [10] proposed the Facilitated Seamless Learning (FSL) framework (Fig. 1), which emphasizes seamless teacher-designed learning activities. In terms of the four learning activities, "learning engagement" refers to formal learning activities designed and implemented by teachers to be conducted at a specific time and place. "Personalized learning" refers to learners learning autonomously and individually after formal classes, integrating what they have learned in the classroom into real life contexts. "Online peer learning" refers to the discussion of the learning records of seamless learning activities online, denoting peer learning to achieve social learning. Finally, "learning consolidation" refers to the process of how teachers guide students to facilitate seamless CFL integration in class, but this teacher guidance does not prevent students from learning integration independently.
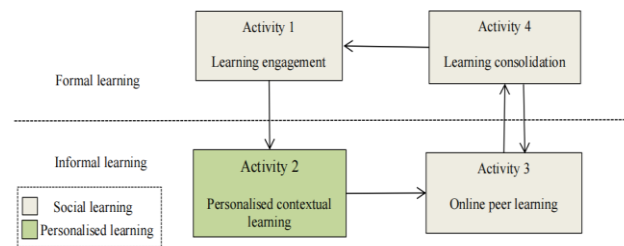

Fig. 1. Facilitated Seamless Learning (FSL) framework [10].

Concordant with FSL, language learning theorists have actively endorsed the use of seamless learning in L2 pedagogies, insofar that it encourages students to combine "fragmented" knowledge and eliminate "seams" and thereby refine the learning process [3, 4]. Thereafter, the FSL-based characterization (or ecological framework) was established and has become gradually accepted by researchers and practitioners across different linguistic contexts as a means to inform the design or analysis of a new seamless learning model (and which would ultimately consolidate into the SLL model).

The Seamless Language Learning (SLL) has been recognized as an effective learning method that incorporates a 1:1 (one or more mobile devices per learner) learner setting, thereby enabling anytime, anywhere learning [4, 7]. The opportunities afforded by mobile technology help enable learning to occur in both formal and informal settings, as well as in individual and social, physical and virtual learning environments. Language learning thus becomes increasingly possible outside of the classroom, with mobile applications supporting students to engage in much-needed language application activities in authentic, real-world (that is, non-classroom) contexts [11]. For instance, some studies have found that SSL has facilitated learning through repetitive language learning activities in both formal and informal settings, across time and locations [14]. Furthermore, learners' proactive and seamless building of linguistic artifacts has the potential to actualize proactive and constructive learning [4]. Technologies enable students to create and combine various forms of media to reflect their comprehension, thereby stimulating active learning mediated by the creation of artifacts [3].

Student experiences of the learning process are crucial in examining the efficiency of seamless learning practice in tertiary institutions. Multiple researches investigating learners' seamless learning experiences have been conducted across a diverse array of countries, such as Iran, Japan, and others [15, 16]. These studies tend to be discipline-specific, focusing on business, mathematics, and foreign languages. Yet despite the immense potential of seamless learning approaches to the experiences of students in the CFL context, the area remains woefully understudied.

Moreover, this is general consensus among academics that online platforms conduct social interactions which facilitate collaborative learning [8]. This is especially pertinent for language learning, given that the ultimate goal of language learning is the successful application of the target language.

Students who are exposed to a variety of possible vocabulary usages, accompanied by illustrative photos shared by their peers, demonstrate a greater propensity to acquire many more examples and thus become more fluent in using the new vocabulary. Some scholars have applied qualitative approaches to determine students' vocabulary acquisition and correct usage learned through SLL, in comparison to traditional (classroom-based) methods [7, 8]. For instance, a study by Wong [17] adopted a case study approach to investigate SLL students' cognitive processes and patterns in artifact creations. His research found that the impact of learner-generated contexts and a mobile-assisted language learning design were effective in enhancing learner habits in generating meaning in their daily L2 encounters. However, a comprehensive survey ascertaining whether social media platforms used in SLL engender better perceptions among learners towards the SLL vocabulary learning approach remains lacking. Understanding learners' perceptions of SLL is crucial for gaining insights into how to effectively facilitate authentic language learning, wherein language acquisition occurs through socialization and practical application [18]. Moreover, social media platforms have been found to mediate the motivational issues students face when required to engage in seamless vocabulary learning activities [19].

Taken together, successful learners engaged in the SLL approach are those who actively engage in authentic learning and produce a variety of linguistic artifacts. Learners who utilize social media in a positive and engaging manner are better able to fully leverage the power of the seamless learning environment to improve their L2 learning (e.g., vocabulary acquisition). This present study emphasizes the Chinese as a Foreign Language (CFL) context. It employs a quantitative approach, in order to investigate the effectiveness of the SLL model on learners' vocabulary learning experience, perception towards the use of an SLL platform (DingTalk), and vocabulary enhancement in the utilization of an SLL model.

III. METHODOLOGY

A Design-Based Research (DBR) methodology was employed for the purposes of this study. DBR focuses on the process of analysis, design, implementation, and testing of a significant intervention.

A. Analysis of Needs

For the purpose of identifying the efficacy of the SLL model, many scholars [20, 21] have advocated a DBR approach, as this methodology is both systematic and flexible. According to the recent work [20], DBR has been found to be the most adopted approach used to measure seamless L2 vocabulary learning. DBR is distinguished by its focus on the practical application of research outcomes in real-world learning settings, allowing for the exploration of variables, rather than strict control [21]. Seeking to take advantage of these, the main output for this study is the learners' (i.e., the participants') learning experience, perceptions towards the use of a digital SLL platform (specifically, DingTalk), and vocabulary enhancement in the utilization of the SLL model. The needs analysis was performed with Chinese language experts, with a view to identify the SLL model to be developed and applied in an enhanced learners' vocabulary learning.

B. Design of Instructions

The participants in this study were 32 CFL learners who were concurrently engaged in tertiary education (10 males, 22 females) with a mean age of 21.5 years. They were selected based on the purposive sampling method from universities located on the Chinese mainland. In particular, participants at the time of testing were approaching Hanyu Shuiping Kaoshi (HSK) level 4 (which corresponds to the Common European Framework of Reference for Languages (CEFR) B2 level) and were assigned to intermediate level Chinese Mandarin classes. That is to say, sampled participants in this study were preparing for HSK level 4, having all passed HSK level 3. Accordingly, the sampled participants all have the ability to make comments or engage in discussions on social media platforms and perform related vocabulary learning activities in the Chinese language.

It is important to mention that all 32 participants were enrolled in a homogeneous HSK Level 4 course, and followed the same curriculum and syllabus, while also sharing similar international student backgrounds. This is beneficial for the present study, insofar that it ensures a consistent educational background among the sample participants. In terms of their experience of mobile devices and social media platforms in language learning, the sampled participants report being sufficiently experienced in using different social media platforms (e.g., Facebook, WeChat) and mobile devices, concordant with the notion that the novelty of network technology has been engrained into the lives of the sampled generation [11]. However, participants had no prior experience of using seamless learning for vocabulary learning purposes. This is advantageous for the present study, as with no prior knowledge of seamless learning, the use of seamless learning techniques would be able to better enable a before/after SLL comparison and thus ensure a more accurate measurement of its effectiveness. Furthermore, the seamless Chinese vocabulary learning was conducted in a real-world (non-classroom) environment, in conjunction with the use of the social media platform—DingTalk. This platform constituted seamless learning space for the participants in the process of seamless Chinese vocabulary learning.

C. Implementation of Instructions

The seamless Chinese vocabulary learning approach was conducted with an initial briefing and introduction to the topic. Learners were briefed on what seamless learning of Chinese vocabulary entails and what they were expected to do. Seamless learning in CFL vocabulary acquisition was implemented through the Seamless Chinese Vocabulary Learning (SCVL) process (Fig. 2) guided by the SLL model. The SCVL was designed to enhance vocabulary learning productivity and foster active learner engagement. The implementation was facilitated using mobile devices and the DingTalk social media platform, which served as the primary tool for seamless learning activities.

The seamless Chinese vocabulary learning process is a repeated and non-linear learning process, consisting of the
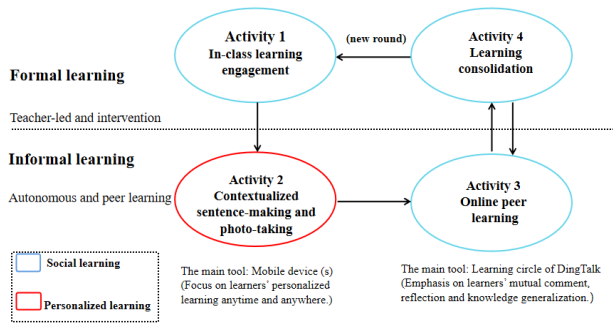
following four activity types:

Fig. 2. Seamless Chinese Vocabulary Learning (SCVL) process (Adapted from [10]).

1) In-class learning engagement: These are learning activities designed and administered by the teacher during formal lessons, such as identifying and learning new vocabulary in the HSK Level 4 textbook passages. This is a preliminary step to prepare students for subsequent activities 2) and 3).

2) Contextualized sentence-making and photo-taking: Learners individually (that is, autonomously) use their mobile devices to create and share social media photo(s) and text(s) relating to their daily encounters, frequently using the target vocabulary, and with reference to the Learning Circle function (a virtual learning group) of DingTalk.

3) Online peer learning: Learners engage in peer review of each other's work and/or engage in online interactions on the online social network by responding to social media created and published online during activities 1) and 2).

4) Learning consolidation: Learners return to formal learning spaces, where they review their autonomous learning activities and peer review under the guidance of the teacher, thereby facilitating their learning consolidation.

To summarize, vocabulary learning began with the instructor's input, followed by contextualized learning of words through real-life situations, which led to the authentic (autonomous) use of the target vocabulary. This gradually extended, in a bottom-up manner, to the writing of sentences, paragraphs and ultimately essays. By integrating these activities within the SCVL framework and utilizing the DingTalk platform, the seamless learning approach has been incorporated into the CFL pedagogy.

Having completed the four-stage pedagogical approach, a pre-test was held to assess the learners' perceptions on the use of seamless learning and their opinions regarding the extent to which SLL supports their vocabulary learning. Next, the learners were introduced to the DingTalk platform. DingTalk, a versatile social media platform compatible with Android, iPhone, Mac, and Windows operating systems, serves as a techno-pedagogical model that bridges formal language learning in the classroom with real-life language application and reflection [18]. To facilitate seamless Chinese vocabulary learning, each learner was equipped with an individual mobile device on a one-to-one basis, granting them uninterrupted access to the platform both inside and outside the classroom, thereby supporting their language learning endeavors. Moreover, individual DingTalk accounts

were provided to engage the learners in seamless Chinese vocabulary learning activities. The learning period focused more on how the learners would utilize the SLL model to apply the new target vocabulary to real-life contexts, so as to investigate learners' vocabulary learning experiences, perception towards the use of SLL platform (Ding Talk), and vocabulary enhancement in the utilization of SLL model. The learners employed their mobile devices to create artifacts comprised of sentences made using target vocabulary, subsequently sharing their daily learning experiences on the HSK Level 4 Learning Circle of the DingTalk platform. At the end of the seamless Chinese vocabulary learning session, the participants underwent a post-test and completed a survey.

D. Testing of Instructional Effects

The pre-test and a post-test conducted to measure the effectiveness of the SLL model comprise 30 questions together, addressing the issues relating to learners' seamless Chinese vocabulary learning. In other words, a seamless Chinese vocabulary learning questionnaire (SCVLQ) was compiled based on the Motivated Strategies for Learning Questionnaire (MSLQ) proposed by Chai *et al.* [3], as well as the research questions and research objectives which guide this present study. The questionnaire underwent validation processes by three CFL experts in Chinese Mainland. After an iterative consultation with the three experts (a senior CFL lecturer and two associate professors in linguistics with an in-depth understanding of the present research) the research questionnaires were affirmed in their final form by a very positive and encouraging validation report, with only minor changes recommended. The SCVLQ investigates the effectiveness of the SLL model on the vocabulary learning experience, perceptions of the DingTalk platform, and vocabulary enhancement. The SCVLQ consists of 30 items answered using a five-point Likert scale to elicit learners' experiences and perceptions towards the SLL approach. The SCVLQ questionnaires comprise three parts. (A): Seamless Chinese vocabulary learning experience (8 items), capturing learners' affectivity, satisfaction and engagement with SCVL. (B): Perception towards the use of DingTalk platform (12 items), including perceptions and motivation (intrinsic motivation and self-efficacy). (C): Vocabulary enhancement (i.e., the improvement or growth of learner's vocabulary knowledge and usage over time) facilitated by the utilization of SLL model (10 items). Following Warmbrod's research [22], Cronbach's alpha reliability coefficient for the SCVLQ is 0.83. Further, the reliability value for each sub-component of SCVLQ is calculated as follows (Table I).

TABLE I: RELIABILITY VALUE FOR EACH SUB-COMPONENT OF SCVLQ

Sub-components	N	Cronbach's Alpha
SCVLQ (A)	8	0.898
SCVLQ (B)	12	0.817
SCVLQ (C)	10	0.864

IV. RESULTS

This section shall explore the findings by sequentially reporting the learners' vocabulary learning experiences, perception towards the use of SLL platform (Ding Talk), and vocabulary enhancement in the utilization of SLL

approaches.

The test results were obtained from a paired sample t-test, determining the difference of means between the pre-test and post-test scores gained from the respective participant tests. Meanwhile, the descriptive statistics were obtained from the mean and standard deviation of these test results.

A. Learning Experience Survey

In answer to RQ 1, hypothesis testing results are shown below.

Null Hypothesis

H01: CFL learners' vocabulary learning experiences using a SLL model is not more positive.

Alternative Hypothesis

Ha1: CFL learners' vocabulary learning experiences using a SLL model is more positive.

The hypotheses test learners' overall experiences towards SCVL by using a paired sample t-test, with the alpha level of significance was set at 0.05. The sample size is 32. This research rejects the null hypotheses if $P < 0.05$. Comparisons between the means of pre- and post-test are presented in Table II.

TABLE II: LEARNER' PRE- AND POST-TEST SCORE RESULT OF SCVLQ (A)

RQ 1	Pre	Post	t	p
SCVLQ (A)	3.88±0.09	4.09±0.06	−4.067	0.01

As shown in Table II, the mean score for the pre-SCVLQ (A) is 3.88 with a standard deviation of 0.09; yet the mean score for the post-SCVLQ (A) is 4.09 with a standard deviation of 0.06. Therefore, an substantial difference from the pre-test to the post-test has been found.

To ensure that the increase of experience scores in learners' post-tests is statistically significant, a paired samples t-test was performed between the mean scores of experience in pre-test and post-test for the group. Table III illustrates the results of a paired samples t-test.

TABLE III: PAIRED SAMPLES T-TEST FOR PRE-TEST AND POST-TEST OF LEARNERS' EXPERIENCES

Paired Differences					t	df	Sig. (2-tailed)
Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
			Lower	Upper			
−0.21000	0.12649	0.05164	−0.34274	−0.07726	−4.067	5	0.010

Since the P value is less than 0.05, H01 is rejected. There is a significant difference in the scores before and after the test. Specifically, there are significant differences between learners before and after the SCVL study in terms of their experiences learning Chinese in a seamless learning environment ($P < 0.05$). Hence, the CFL learners' affectivity, satisfaction and engagement with SCVL were generally positive and favorable.

B. Perceptions on the Use of the DingTalk Platform

To address RQ 2, the hypothesis testing results are shown below.

Null Hypothesis

H02: The effects of the SLL model on CFL learners' perceived the use of DingTalk platform is not positive.

Alternative Hypothesis

Ha2: The effects of the SLL model on CFL learners' perceived the use of DingTalk platform is positive.

Next, the null and alternative hypotheses were investigated. The hypotheses tested whether seamless learning platform DingTalk will engender positive perceptions among students towards SCVL. Using paired sample t-test, the alpha level of significance was set at 0.05. The sample size is 32. For the region of rejection, this research rejected the null hypotheses if $P < 0.05$. Table IV shows the comparisons between the means of pre and post SCVLQ (B).

TABLE IV: LEARNERS' PRE- AND POST-TEST SCORE RESULT OF SCVLQ (B)

RQ 2	Pre	Post	t	p
SCVLQ (B)	3.74±0.17	4.14±0.14	−6.608	0.000

As shown in Table IV, the results reveal that this difference is very sharp in post-SCVLQ (B) results, as the mean score achieved is 4.14 with a standard deviation of 0.14, while the mean score for the pre-SCVLQ (B) is 3.74 with a standard deviation of 0.17.

Next, to check whether the increase in perception scores in the post-test of the learners is statistically significant, a paired samples t-test was performed between the mean scores of experience in the pre-test and post-test for the group. Table V describes the paired samples t-test of SCVLQ (B).

TABLE V: PAIRED SAMPLES T-TEST FOR PRE-TEST AND POST-TEST OF LEARNERS' PERCEPTIONS

Paired Differences					t	df	Sig. (2-tailed)
Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
			Lower	Upper			
−0.39875	0.17067	0.06034	−0.54143	−0.25607	−6.608	7	0.000

Since the P value is less than 0.05, H02 is rejected. There is a significant difference in the scores before and after the test ($P < 0.05$). Therefore, learners exhibit better perceptions and motivation (intrinsic motivation and self-efficacy) towards

their use of the DingTalk platform, and by extension, towards SLL approaches.

C. Vocabulary Enhancement Test

To answer RQ 3, the hypothesis testing results are shown below.

Null Hypothesis

H03: The impacts of the SLL model on CFL learners' vocabulary learning enhancement is not significant.

Alternative Hypothesis

Ha3: The impacts of the SLL model on CFL learners' vocabulary learning enhancement is significant.

By using paired samples t-test, the hypotheses were tested to examine the extent to which learners perceive that SCVL has improved their vocabulary acquisition in the context of Chinese writing. The alpha level of significance was set at 0.05. The sample size is 32. For the region of rejection, this research rejected the null hypotheses if $P < 0.05$. Table VI reveals the mean scores of pre- and post-SCVLQ (C).

TABLE VI: LEARNERS' PRE- AND POST-TEST SCORE RESULT OF SCVLQ (C)

RQ 3	Pre	Post	t	p
SCVLQ (C)	3.77±0.17	4.08±0.12	−6.920	0.000

Table VI indicates that the mean score for the pre-SCVLQ (C) is 3.77 with a standard deviation of 0.17, but the mean score for the post-SCVLQ (C) is 4.08 with a standard deviation of 0.12. Therefore, the finding describes the score of post-test were significantly greater than pre-test.

To investigate whether the increase in improvement scores is significant, Table VII shows the paired samples t-test of SCVLQ (C).

TABLE VII: PAIRED SAMPLES T-TEST FOR PRE-TEST AND POST-TEST OF LEARNERS' VOCABULARY ENHANCEMENT

Paired Differences					t	df	Sig. (2-tailed)
Mean		Std. Error Mean	95% Confidence Interval of the Difference				
	Std. Deviation		Lower	Upper			
−0.31200	0.14258	0.04509	−0.41400	−0.21000	−6.920	9	0.000

Since the P value is less than 0.05, we can reject H0. Consequently, there is a significant difference in the scores before and after the test ($P < 0.05$). As such, we can affirm that learners report a positive perception towards the usefulness of the SLL approach in improving their vocabulary learning and promoting their vocabulary growth and usage over time.

V. DISCUSSION AND CONCLUSION

The model of seamless language learning has been shown to be effective in aspects of vocabulary learning, as evidenced by the positive learning experiences reported, the positive perceptions reported regarding use of the DingTalk platform, and the significantly enhanced vocabulary acquisition, as indicated by the paired samples t-test results. One possible explanation is that positive learning experiences and affections are strong motivators, encouraging foreign language learners to be more proactive in their subjective learning processes [15, 19]. The findings generated in this research corroborate the investigation by Goh *et al*. [23] on CFL learners, which revealed a similarly positive learning experience in the context of Active Blended Learning (ABL). The results of this present study suggest that applying SLL models in learning Chinese vocabulary is likely to encourage CFL students to become more active learners, thereby facilitating the learning process. It is also likely that learners appreciate how the DingTalk platform is free to use [18]. Accordingly, many scholars believe that learners' perceptions towards language learning could be directly influenced, either positively or negatively, by the ease of use and autonomous learning opportunities afforded by social media platforms [13, 18, 19].

The findings generated in this paper are concordant with the literature, including the work of [24], who examined a seamless Chinese vocabulary learning experience mediated by cloud and mobile technologies among Singapore CFL learners in primary school contexts. According to the interview data therein, the authors found that student motivation and perceptions towards the use of mobile devices and the MyCLOUD learning platform were generally positive and facilitated a seamless learning environment. Furthermore, the findings of the present study, especially the results of the post-SCVLQ (B) questionnaire, reveal that the majority of students believed using DingTalk platform was beneficial to them, as a way to motivate them to learn Chinese vocabulary autonomously. They discovered that the platform functions are easy to use and are accessible, making it convenient for them to access and practice vocabulary more. This result is in line with the expectations of the authors, given that social media platforms are increasingly used to support learners communicative and creative endeavors [3, 4]. The findings of this research thus support the argument that social media platforms facilitate language acquisition by offering a process-oriented learning, promoting interactions among learners or between learners and their teacher. This is consistent with the research, which found that the majority of students in a Chinese university agreed that the DingTalk platform helped support an interesting and interactive language lesson [18]. Moreover, the results of the post-SCVLQ (C) indicate that students perceived their vocabulary to be substantially enhanced, on the basis that a seamless learning platform was provided and active use of a mobile device for vocabulary learning was encouraged, increasing learner autonomy [24]. Additionally, the fun factor associated with SLL model is likely to appeal to learners, helping to motivate them to learn L2. Hence, the implications of this present study is that the use of the SLL model yields a positive effect on CFL learners' vocabulary learning and promotes learner vocabulary acquisition. The results of the current study are beneficial to educators who seek to improve their apply SLL approaches to encourage

seamless vocabulary learning experiences and promote more sustained language learning outcomes.

In summary, this study generates novel quantitative empirical evidence, demonstrating that the use of the SLL model has significant positive effects on learners' vocabulary acquisition, perception towards the use of SLL platforms (specifically DingTalk), and vocabulary enhancement . Seamless learning stimulates a method of active, fun and autonomous learning that allows more successful knowledge retention and lifelong learning. This is particularly crucial in the context of the Covid-19 global pandemic, where formal language learning issues are exacerbated by ineffective vocabulary learning practices, resulting in difficulties with vocabulary use in a real-world settings [25].

Despite these findings, two limitations of the research can be identified. The study's focus on intermediate-level learners limits the generalizability of the findings to other proficiency levels. In future research, including learners at different proficiency levels (such as HSK level 5 or 6) would enhance our understanding of the SLL model. Additionally, comparing seamless learning outcomes among intermediate-level students with different summative assessment contexts would provide valuable insights into the effectiveness of SLL model for learners at various proficiency levels.

To build on this research, future studies are recommended to adopt longitudinal designs to assess the long-term effects of SLL on vocabulary learning and language proficiency. Investigating the interaction between individual learner characteristics and the effectiveness of SLL has the potential to lead to more personalized language learning experiences. Overall, the SLL model assisted learners in becoming active learners while concurrently improving student learning experiences, perceptions towards the use of the targeted SLL platform (DingTalk), and vocabulary enhancement.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Xiaosheng Zhou contributed to the conception and design of the study, data collection and analysis, interpretation of the results, and drafting and revising the manuscript. Ying Soon Goh provided critical feedback and contributed to the intellectual content of the research. All authors have read and approved the final version of the manuscript for submission.

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