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Effectiveness and User Acceptance of Using Out-of-class E-learning Activities to Support Classical Chinese Learning*

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Abstract

The study aimed to explore the effectiveness and both teachers' and students' acceptance of using three types of e-learning activities, namely online teaching videos, Internet resources, and digital games, to learn classical Chinese (CC) in the out-of-class context. Thirteen Chinese language teachers and 551 students from five secondary schools in Hong Kong participated in the study on a voluntary basis. The findings of pre- and post-test comparisons indicated that students used CC reading strategies more frequently, improved their self-efficacy and intrinsic motivation in CC reading, and participated in more self-learning activities after using the e-learning activities. User acceptance of e-learning activities was examined based on the Technology Acceptance Model (TAM). Findings of regression analysis and structural equation modeling generally support the hypothesized TAM, suggesting that students' perception of the e-learning activities would affect their intentional use, and, in turn, their actual use of the

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e-learning activities. Students' perceived playfulness and teacher encouragement of the e-learning activities were the most critical reasons for them to accept and participate in the activities. Implications of the findings are discussed to provide insights into the applicability of using e-learning as a new learning approach in a traditional school subject.

Keywords: motivation, self-learning, strategy use, technology acceptance, technology enhanced language learning.

1. Introduction

E-learning has been a growing trend in recent decades (Beetham and Sharpe 2019), as it has proven to be effective in providing interactive, nonlinear access to a broad spectrum of multimedia content (Jonassen 2000), offering students the flexibility to learn at their own pace (Lee and Tsai 2011) and fostering students' skills and motivation to navigate the learning process of complicated subjects (Goodman 2002). The incorporation of online learning materials and electronic systems makes the learning process more flexible, dynamic, and interesting than traditional instruction (Goodman 2002; Johnson and Davies 2014). The present study collaborated with front-line teachers to design and implement e-learning activities to support students' learning of classical Chinese (CC) reading in the out-of-class context. Guided by the Technology Acceptance Model (TAM; Davis 1989), the study collected both teacher and student questionnaires to examine their acceptance of the e-learning activities and the effectiveness of these activities in enhancing students' strategy use, reading motivation, and self-learning habit in CC reading. It aimed to extend the research of technology enhanced learning and TAM to a new learning context which has been dominated by the traditional teacher-centered instruction. The findings should shed light on the applicability of using e-learning as a new learning approach in a traditional school subject.

2. Literature Review

2.1 User Acceptance of Technology Enhanced Learning

"User acceptance of technology" is defined as a demonstrated behavior or readiness of users to employ a specific technology for the tasks it intends to support (Davis 1989). Many models have been proposed to examine the core determinants of users' intention to use and the actual use of technologies (Venkatesh et al. 2003). Understanding such determinants enables researchers to explain usage and offer suggestions for improving technology utilization. Among various models, Technology Acceptance Model (TAM) was chosen as the theoretical framework of this study because it has been widely used and validated in many previous studies (King and He 2006; Scherer, Siddiq and Tondeur 2019).

In the basic TAM, two key factors of technology acceptance, perceived usefulness – the prospective user's subjective probability that using the target system will improve his/her performance – and perceived ease of use – the extent to which the prospective user expects the system to be easy to use –, have been posited as two core determinants of users' attitudes, which then directly influence their behavioral intention to use the technology (Davis 1989; Venkatesh and Davis 2000). Many researchers have extended TAM by suggesting additional factors that may affect technology acceptance. For instance, internal factors such as perceived playfulness or enjoyment (e.g., Moon and Kim 2001; Padilla-MeléNdez, Aguila-Obra and Garrido-Moreno 2013) and computer self-efficacy (e.g., Teo 2019) have been added; external factors added are facilitating conditions such as subjective norms (Scherer et al. 2019) and social influence (e.g., Venkatesh et al. 2003). In addition, users' actual use in addition to their intentional use has been added as an outcome variable to further validate the model (e.g., Edmunds, Thorpe and Conole 2012). To date, over 70 variables have been proposed (Yousafzai, Foxall and Pallister 2007), and the inclusion of additional variables in studies may vary with technology, target users, and context (Moon and Kim 2001).

While previous TAM studies have provided empirical support for the model, two limitations are noted. First, most TAM studies focused on subjects in the fields of mathematics, engineering, and science (e.g., Zacharis 2012; Cheng 2019;

Estriegana, Medina-Merodio and Barchino 2019). Since the effectiveness of e-learning can be moderated by subject area (Cheng, Ritzhaupt and Antonenko 2018), the factors affecting user acceptance may vary due to the nature of the different subjects. Thus, more TAM studies in areas such as the arts and humanities are still found wanting. Second, most of the existing studies have focused on teachers' technology acceptance. A meta-analysis on teachers' technology adoption identified over 100 relevant studies (Scherer et al. 2019), while TAM studies conducted among students are rather limited and mostly focused on surveying students in universities (e.g. Park 2009; Zacharis 2012; Costa, Alvelos and Teixeira 2018). Regardless of teachers' readiness, technology adoption will not be effective if students remain reluctant. Therefore, it is crucial to further investigate the perspective of students from different levels. Moreover, although teachers and students may show different attitudes toward the same technology (Lin, Zimmer and Lee 2013), most previous TAM studies have included teacher or student participants and seldom compared the similarities and differences in acceptance between these two types of users.

2.2 Using E-learning Activities to Learn Classical Chinese

Classical Chinese (CC) was the official written language in ancient China until the turn of the twentieth century, when it was replaced by modern Chinese (Pulleyblank 1995). Learning to read CC texts is a core component of the Chinese language curriculum in Chinese societies as it is essential for Chinese students to access Chinese cultural heritage (Xiong 1993). However, previous empirical studies conducted in different Chinese societies, including mainland China (Gao 2016), Taiwan (Chi and Chiou 2015), and Hong Kong (Lau 2017, 2019), have revealed that Chinese students generally have poor performance and motivation in CC reading. Students' reading difficulties mainly cause by the linguistic differences between CC and modern Chinese (Xiong 1993; Zhang 2005) and their insufficient background knowledge of ancient Chinese culture (Zhao 2004; Lau 2018). Many students consider CC to be too difficult to handle, boring, and irrelevant to contemporary life and, thus, exhibit poor self-efficacy and intrinsic motivation in CC reading (Wei 2009; Lau 2019). When teaching CC texts,

teachers have largely adhered to the traditional practice of taking an authoritative position in providing students with explanations of the whole text (Chen 2013; Tang and Sun 2013; Lau 2017). This teacher-centered approach has been criticized for encouraging students to passively follow teachers' instructions and rely on the recitation of standardized explanations. Nevertheless, teachers hesitate to attempt alternative approaches due to students' weak CC reading competence and reluctance to take an active role in the learning process (Chen 2013; Tang and Sun 2013; Lau 2017).

In recent years, there has been a growing trend in investigating the benefits of technology-enhanced language learning (Lin et al. 2020). While previous studies have shown that different types of e-learning activities help students cultivate positive attitudes toward language learning and improve their performance, most of them were conducted in the field of learning English (e.g. Hsieh, Huang and Wu 2017; Turan and Akdag-Cimen 2019) or Chinese as a second language (e.g. Tseng, Lin and Chen 2018; Wang, An and Wright 2018). Only two small-scale studies addressed CC reading instruction. Chen and Lin (2015) developed a digital game-based situated learning system to facilitate high school students' understanding of the content of four CC poems. Their results showed that student users viewed the system positively and had significantly better learning achievements than students who received traditional lecture-based instruction, as well as that both perceived usefulness and perceived ease of use were significantly related to students' behavioral intention. Wang (2016) developed a mobile-assisted learning system to promote senior high school students' learning of a CC using a flipped classroom design. Flipped classroom is a form of blended learning which changes the traditional teacher-centered classroom to student active learning by having students study content material prior to class through online learning to free up in-class time for more interactive and higher-level learning activities (Fulton 2012). The results showed that students who used the system had better motivation than those who only learned using traditional textbooks. Although students generally had positive attitudes toward the system, many revealed that their parents did not allow them to spend too much time using their mobile devices. Wang suggested that while flipped

learning should be useful to change the traditional teacher-centered approach in Asian countries, learners' cultural background should be considered when implementing e-learning activities.

Although very few studies have directly investigated CC instruction, the promising results of previous studies on technology-enhanced learning suggest that e-learning activities have considerable potential to facilitate CC learning. Regarding students' reading difficulties at the lexical level, the successful experiences of using teaching videos to support students' learning of fundamental knowledge and skills in flipped classroom (Chen Hsieh, Wu and Marek 2017; Kirmizi and Kömeç 2019) suggest that teaching videos can be used for frequent revisions of CC linguistic knowledge and vocabulary. Digital games can also be used to practice CC linguistic knowledge and reading strategies (Hwang, Wu and Chen 2012; Lin et al. 2020). Students' problems of insufficient background knowledge and inability to link the content of CC texts to daily life can be tackled by providing appropriate Internet resources as supplementary learning materials (Renau and Pesudo 2016). The advantages of e-learning activities in enhancing the various aspects of student motivation can also be applied in the context of CC learning. For example, students can enhance their self-efficacy in CC reading by learning CC linguistic knowledge and reading strategies from teaching videos (Akçayır and Akçayır 2018). Interesting and authentic Internet resources can also enhance intrinsic motivation (Jefferies and Hussain 1998). In comparison to traditional paper-based assignments, the interactive and playful features of digital games can increase students' intrinsic motivation to practice their CC reading skills (De Grove, Bourgonjon and Van Looy 2012). Students' extrinsic motivation can also be enhanced through various game elements, such as badges, level progressions, and leader boards (Estriegana et al. 2019).

Despite the potential benefits of e-learning, it can be more challenging for students to participate in CC e-learning activities than in other school subjects. Previous studies have indicated that, as students need to play a more active role in e-learning than in traditional teacher-centered instruction, their ability and motivation are key factors for success in e-learning (Sletten 2017; Lin et al. 2020). High-achieving students' high self-efficacy and aspiration for learning has

been regarded as a major reason behind their repeated use of an e-learning tool (Hsieh et al. 2017). As mentioned above, findings in previous studies have revealed that most Chinese students have poor CC reading abilities and motivation (Chi and Chiou 2015; Gao 2016; Lau 2018, 2019). Participating in e-learning activities for CC learning requires a certain level of CC mastery to understand examples and tasks. Hence, students with poor CC reading ability and motivation may not be willing to pay extra time to learn CC in out-of-class e-learning activities. In addition, some studies have found that students who have long adapted to traditional instruction may feel reluctant to accept e-learning (Lin et al. 2013; Akçayır and Akçayır 2018; Bond 2020). Since teacher-centered instruction is the dominant approach to teaching CC reading, students who are used to rely heavily on their teachers may have a low tendency to participate in independent e-learning activities.

3. Purpose of the Study

In view of the potential benefits and challenges of adopting e-learning to learn CC reading, this study aimed to explore the effectiveness as well as teachers' and students' acceptance of using three types of e-learning activities – online teaching videos, Internet resources, and digital games – to learn CC reading in the out-of-class context. It aimed to extend the research on technology-enhanced language learning and TAM to a new learning context that has been dominated by traditional teacher-centered instruction. The effectiveness of e-learning activities was examined by comparing the pre- and post-test measures of students' strategy use, reading motivation, and self-learning habits in CC reading. User acceptance of the e-learning activities was explored based on TAM. The hypothesized TAM in this study included three core elements of TAM – perceived usefulness, perceived ease of use, and behavioral intention – and three additional variables – perceived playfulness, teacher encouragement, and actual use. As revealed in previous studies (Lau 2017, 2019), most Hong Kong students have poor motivation in CC reading. Perceived playfulness and teacher encouragement were added to the model to verify whether they would serve as important internal (Moon and Kim 2001) and external reasons (Cheng

2019), respectively, for motivating students to participate in CC e-learning activities. Actual use was included in the model to verify not only the intention but also the actual adoption of e-learning activities by the teachers and students (Edmunds et al. 2012). The model hypothesized that perceived usefulness, perceived ease of use, perceived playfulness, and teacher encouragement would affect students' behavioral intention and, in turn, their actual use of CC e-learning activities (see Figure 1).

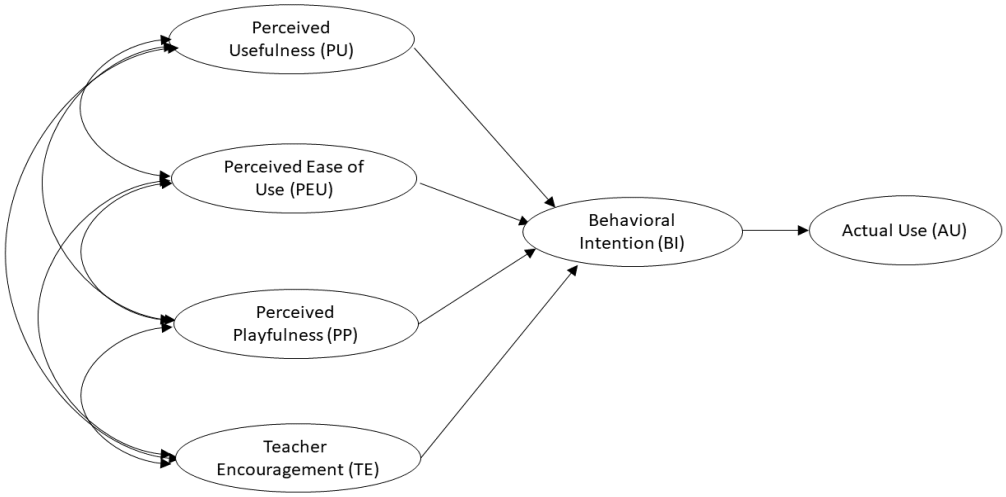

Figure 1: The hypothetic Model of the Study

Specifically, this study sought to answer the following research questions:

RQ1: Did students improve their strategy use, motivation, and self-learning habits in CC reading after participating in e-learning activities?

RQ2: How frequently did teachers and students use the three types of e-learning activities?

RQ3: How did teachers and students perceive the usefulness, ease of use, and playfulness of e-learning activities for learning CC reading?

RQ4: Did students' perceived usefulness, perceived ease of use, perceived playfulness, and teacher encouragement significantly affect their behavioral intention and, in turn, their actual use of e-learning activities?

4. Materials and Methods

4.1 Participants

Since Hong Kong students usually start learning CC texts when they enter secondary school, this study targeted junior secondary students. Invitations were sent to schools that were interested in experimenting e-learning activities in CC reading instruction. Five schools accepted the invitation and selected students from one junior secondary grade to participate in the study. The study sample included 13 Chinese language teachers and 551 students (192 boys, 322 girls[1], and 37 of unreported gender), 431 from Grade 7 and 120 from Grade 8. All students were between 11 and 14 years old (mean = 12.23 years; SD = .79). Teacher and student content were sought to ensure their participation in the study was on a voluntary basis.

4.2 Design of E-learning Materials and Activities

Three types of e-learning materials and activities, namely online teaching videos, Internet resources, and an online game platform, were designed in accordance with previous research on CC reading and junior secondary students' ability level and interest. Based on the principle of flipped learning that e-learning activates were used to support and extend teachers' in-class teaching of CC texts, the first two types of e-learning materials were designed for pre-class preparation whereas the online game platform was designed for students to practice the learned strategies after class.

Online teaching videos: Eight types of word interpretation strategies derived from lexical and syntactic differences between CC and modern Chinese (Zhou 2007; Hu 2010), including addition, change, reordering, use of sentence structure, contextual cues, syntactic cues, morphological cues, and phonological cues, were grouped into three online teaching videos in the format of PowerPoint slideshows with a voice-over narrative. Each video explained the strategies, modeled the steps, and used examples from students' CC texts to teach them how to apply the strategies when explaining CC words. The three videos were

[1] Since one of the participating schools was a girls' school, the number of girls participating in the study was greater than that of boys.

assigned to three different CC texts. Students were asked to watch each video and complete a pre-class exercise before learning each CC text. Examples of the PowerPoint slides used in the online teaching videos are shown in Appendix 1.

Online game platform: The online game platform *Adventure Park of Classical Chinese Words* was designed for students to practice the word interpretation strategies. The platform included six games: word forest (addition, change, syntactic cues, and contextual cues), font island (morphological cues), pronunciation castle (phonological cues), ordering ladder (reordering), couplet mountain (sentence structure), and filling garden (addition). Rules, tips and examples, level progressions, and leaderboards were available on the platform to provide support and increase the attractiveness of the games. Students were encouraged to play different types of games after learning the corresponding strategies in a CC text. Examples of the online game platform are shown in Appendix 2.

Internet resources: Different types of Internet resources, such as news, stories, comics, commentaries, and YouTube videos, were selected based on the theme of each CC text. Students were asked to read the Internet resources to prepare for classroom discussions and activities. This activity aimed to facilitate students' in-depth comprehension of the CC texts by connecting the themes of the texts to their daily lives. An example of a student worksheet with the links of Internet resources and classroom discussion questions is shown in Appendix 3.

4.3 Instruments

CC learning questionnaire: This questionnaire consists of three sections. The first asks students to report on a 6-point Likert scale how often they use each strategy when reading CC texts. Items were designed based on the CC word translation and inference strategies proposed by Chinese language scholars (Wei 2009; Hu 2010). The second measures students' self-efficacy, intrinsic motivation, and extrinsic motivation in CC reading on a 6-point Likert scale. Items in this section were adapted from the Chinese reading motivation questionnaire (Lau 2004), which was developed based on the motivation for reading questionnaire (Wigfield 1997). The wording of some items was revised to suit the context of

CC reading. The items in the first and second sections were validated in the author's previous studies (Lau 2018, 2020). The third asks students to report how often they participated in different types of self-learning CC reading activities on a 6-point Likert scale.

Technology acceptance questionnaire: This questionnaire was designed based on previous TAM studies (Davis 1989; Venkatesh and Davis 2000; Moon and Kim 2001; Teo 2019) and piloted in a study by the Lau (2020). A teacher and student versions of this questionnaire with identical items but different wordings were separately used to measure teacher and student acceptance of using e-learning activities to facilitate CC reading. It consists of three sections. The first asks teachers/students to report their frequency of use of the three types of e-learning activities on a 4-point Likert scale. The second measures student/teacher perception on the use of e-learning activities to learn CC reading. Both the teacher and student questionnaires include perceived usefulness, perceived ease of use, perceived playfulness, and behavioral intention items. Teacher encouragement items are only included in the student questionnaire. All items in this section are rated on a 6-point Likert scale. The third section is an open-ended question asking teachers/students to comment on the strengths and weaknesses of using e-learning activities to learn CC reading or give suggestions for improving the activities.

The sample items and internal consistency reliabilities of all sections in the two questionnaires are shown in Table 1.

Table 1: Sample Items and Reliability Estimates for the Questionnaires Used in the Study

Subscale	No. of items (scale)	Cronbach's alpha	
		Pre-test	Post-test
CC Learning Questionnaire			
Strategy use: I use the addition strategy to convert a monosyllabic CC word into a disyllabic word.	10 (1-6)	.87	.90
Self-efficacy: My CC reading ability is good.	6 (1-6)	.90	.92
Intrinsic motivation: I think reading CC texts is interesting.	6 (1-6)	.91	.92
Extrinsic motivation: I learn how to read CC texts well because I want to get a good grade on examinations.	6 (1-6)	.88	.90
Self-learning activities: I do pre-class preparation before I learn a new CC text.	6 (1-6)	.90	.94
Technology Acceptance Questionnaire			
Actual use: In this academic year, how many times did you participate in the following e-learning activities?	3 (1-4)	/	.78
Behavioral intention: I will continue to use e-learning activities to learn CC reading.	2 (1-6)	/	.87
Perceived usefulness: E-learning activities help me improve my CC reading performance.	3 (1-6)	/	.93
Perceived ease of use: It is easy to use e-learning activities to learn CC reading.	3 (1-6)	/	.89
Perceived playfulness: E-learning activities stimulate my curiosity for learning CC reading.	3 (1-6)	/	.93
Teacher encouragement: My teacher encourages me to participate in CC e-learning activities.	2 (1-6)	/	.87

Note: The original questionnaires were written in Chinese. Sample items given in the table are the English translations of the items.

4.4 Procedure and Data Analysis Plan

The study was conducted in the academic year of 2019/20. Regular researcher-teacher collaborative meetings were planned to discuss the design and implementation of CC e-learning activities. At the first meeting, each school chose three CC texts to try out the e-learning activities in that academic year. However, due to class suspension under the outbreak of COVID-19, two schools were unable to finish teaching all selected texts. A WhatsApp group was set up to conduct online discussions between researchers and teachers to replace the collaborative meetings originally planned. Pre- and post-test CC learning questionnaires were administered at the beginning of and near the end of the academic year. The TAM questionnaire was administered only in the post-test data collection. To answer RQ1, paired-sample t-tests were used to check whether there were significant differences in students' strategy use, motivation, and self-learning habits between before and after using the e-learning activities. To answer RQ2 and RQ3, descriptive statistics were used to examine teachers' and students' frequency of use and perception of e-learning activities. Teachers' and students' comments given in the open-ended question were used to supplement the quantitative data. To answer RQ4, the study's hypothesized TAM was examined by regression analysis and structural equation modeling.

5. Results

5.1 Effectiveness of Using E-learning Activities to Learn CC Reading

A series of paired-sample t-tests was performed to compare the pre- and post-test measures of the CC learning questionnaire. As shown in Table 2, significant changes were found among most of the outcome variables. Specifically, students used CC reading strategies more frequently, improved their self-efficacy and intrinsic motivation in CC reading, and participated in more self-learning CC reading activities after using the CC e-learning activities. Only their extrinsic motivation remained unchanged at the end of the study. These findings suggest that e-learning activities are useful tools to facilitate CC learning.

Table 2: Pre- and Post-test Comparisons on Students' Strategy Use, Motivation, and Self-learning Habits

Measured Variables	Time	Mean	Difference of mean	*t*
Strategy use	1	3.70	.11	2.30*
	2	3.81		
Self-efficacy	1	3.13	.30	5.79***
	2	3.43		
Intrinsic motivation	1	3.19	.25	4.04***
	2	3.44		
Extrinsic motivation	1	3.78	.03	.49
	2	3.81		
Self-learning activities	1	2.89	.33	5.55***
	2	3.22		

Note: Time 1 = before using the e-learning activities; Time 2 = after using the e-learning activities; $^{*}p < .05$; $^{***}p < .001$

5.2 Teacher and Student Use and Perception of the E-learning Activities

As shown in Table 3, teachers reported a moderately high mean score (2.74 out of 4) of asking their students to use e-learning activities, whereas their students reported a moderately low mean score (2.28 out of 4) for participation in the activities. Among the three types of e-learning activities, teachers used Internet resources most frequently, followed by teaching videos and online games. Students reported a similar frequency of using teaching videos and Internet resources, with online games being the least used activity. Most teachers and students used each type of activity two to five times during the study (see Table 4). Teachers generally showed a moderate to high degree of perceived usefulness, perceived ease of use, and EE regarding the e-learning activities (mean scores ranged from 3.59 to 3.90) and a high behavioral intention (4.27) to use e-learning activities to support students' CC learning. Students' ratings in all variables were moderate (mean scores ranged from 3.38 to 3.57). Both teachers and students gave the highest ratings in perceived usefulness, followed by perceived ease of use and perceived playfulness.

Table 3: Means and Standard Deviations of All Measured Variables in the TAM Questionnaire

Measured Variables	Teacher Questionnaire		Student Questionnaire	
	Mean	SD	Mean	SD
Perceived Usefulness (PU)	3.90	.91	3.53	1.10
Perceived Ease of Use (PEU)	3.74	1.04	3.46	1.11
Perceived Playfulness (PP)	3.59	1.00	3.38	1.22
Teacher Encouragement (TE)	/	/	3.57	1.22
Behavioral Intention (BI)	4.27	.88	3.41	1.25
Actual Use (AU)	2.74	.43	2.28	.73

Note: AU was measured on a 4-point Likert scale and other variables were measured on a 6-point Likert scale.

Table 4: Descriptive Statistics of Teachers' and Students' Actual Use of Different Types of E-learning Activities

Types of E-learning Activities	Mean (1-4)	Percentage of Each Option (%)			
		Never	1 time	2-5 times	More than 6 times
Online Teaching Videos					
Teacher questionnaire	2.62	0	15.4	84.6	0
Student questionnaire	2.37	18	32.7	43	6.2
Internet Resources					
Teacher questionnaire	2.85	0	15.4	69.2	15.4
Student questionnaire	2.32	21.4	32.8	38.4	7.4
Online Game Platform					
Teacher questionnaire	2.73	15.4	30.8	53.8	0
Student questionnaire	2.17	28.6	30.6	36.2	4.5

In the open-ended question of the TAM questionnaire, teachers generally made positive comments on the use of e-learning activities to support students' CC learning and the design of the three types of activities. Most comments were related to the perceived playfulness or motivational function of the e-learning

activities. For example, they said the e-learning activities “were interesting and attractive,” “looked fresh to students,” “enhanced students’ interest in CC reading,” and “motivated students to learn.” Regarding the perceived usefulness of the e-learning activities, teachers said the activities “enhanced students’ learning of CC reading,” “facilitated students’ comprehension of the CC texts,” and “encouraged students’ self-learning.” No comments were found on perceived ease of use. Some teachers pointed out that insufficient teaching time was the main reason for not fully using the activities. Among the three types of e-learning activities, teachers gave the most positive comments on Internet resources. Since the materials were selected based on the themes of the selected CC texts, teachers found the materials useful for students to prepare for and extend the learning of the texts outside of the lessons. Although most teachers commented on the teaching videos as clear and easy to learn, one said the videos were boring and one suggested adding more animations to attract students. Most teachers commented on online games as interesting and attractive, but one said the games were too easy and some suggested adding more levels and types of games to the platform.

Diverse views were found among the students’ answers to the open-ended question. Similar to their teachers, students were most concerned about the playfulness of the e-learning activities. While many students described the activities as interesting, playful, and effective in increasing their motivation to learn CC reading, some of them considered the activities boring and tedious. Regarding students’ perceived usefulness of the e-learning activities, some said the activities helped them “learn more knowledge,” “know more CC vocabulary,” and “apply what they learned in daily life.” However, some students said that e-learning was less effective than face-to-face classroom learning because they “could not ask questions,” “could not get immediate feedback from teachers,” and “easily became inattentive” when participating in e-learning activities. Regarding students’ perceived ease of use, only one student mentioned the Internet problem and one said that participating in e-learning activities was “troublesome.” Some students indicated that the activities were too difficult or complicated for them.

5.3 Factors Affecting Student Acceptance and Use of the E-learning Activities

Since the number of participating teachers was small, only the student questionnaire data were used to examine the hypothesized model of the study. The findings of the stepwise regression analysis indicated that perceived usefulness (β = .17, t = 3.84, p < .001), perceived ease of use (β = .18, t = 3.64, p < .001), perceived playfulness (β = .48, t = 10.62, p < .001), and teacher encouragement (β = .12, t = 5.08, p < .001) were all significant predictors of behavioral intention. The model accounted for 82% of the variance in behavioral intention (F = 493.42, p < .001). When all variables were used to predict actual use, the findings indicated that only perceived playfulness (β = .34, t = 6.01, p < .001) and teacher encouragement (β = .25, t = 4.56, p < .001) remained significant predictors. The model accounted for 29% of the variance in AU (F = 88.12, p < .001).

Structural equation modeling (SEM) using the SPSS Amos 25 software was performed to further examine the hypothesized model. The findings indicated that the model provided an adequate fit to the data (CFI = .99; NFI = .97; TLI = .98; RMSEA = .04). The completely standardized parameter estimates of the significant correlations between the variables in the model are shown in Figure 2. Among the four exogenous variables, only perceived playfulness (.80, p < .001) and teacher encouragement (.24, p < .001) had significant effects on behavioral intention. Behavioral intention had a strong and positive direct effect (.61, p < .001) on actual use. Perceived playfulness had a strong and positive indirect effect (.49, p < .001) on actual use through its effect on behavioral intention. These findings support the hypothesized model, suggesting that students' perception of e-learning activities would affect their intentional use and, in turn, their actual use of the activities. The results of both the regression analysis and SEM suggest that, among the various factors examined in the model, students' perceived playfulness and teacher encouragement to the e-learning activities were the most critical reasons for students to accept and participate in the activities.

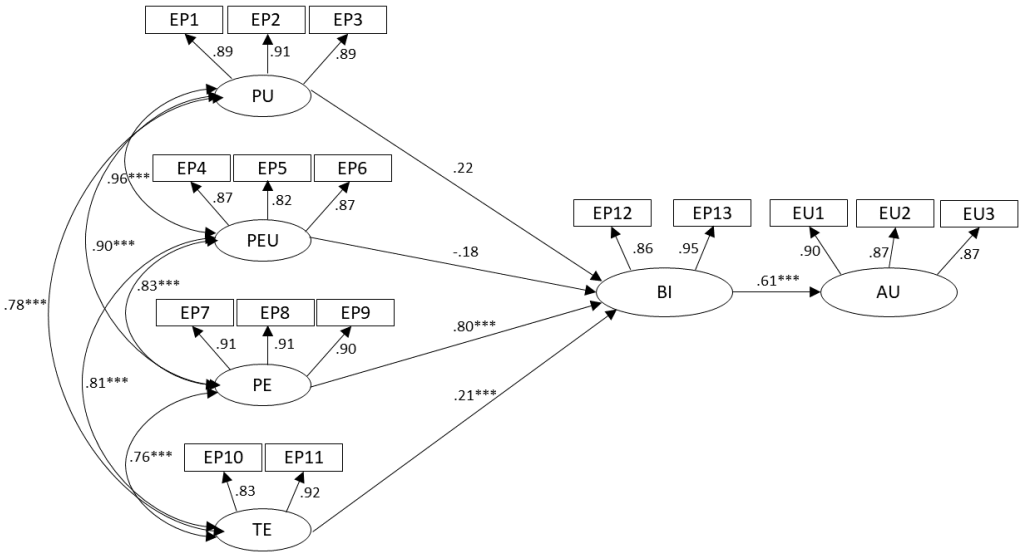

Figure 2: The Completely Standardized Parameter Estimates of the Significant Correlations between the Variables in the SEM Model

6. Discussion

Consistent with other studies on technology-enhanced language learning (e.g., Lin et al. 2020; Turan and Akdog-Cimen 2019), the positive changes in students' strategy use, self-efficacy, intrinsic motivation, and self-learning habits in the post-test measures suggest that e-learning is also effective in facilitating students' learning of CC reading. Students' improvement in their strategy use confirms that e-learning is useful to teach and promote strategy use (Johnson and Davies 2014; Çakıroğlu and Öztürk 2017). The major difficulty in CC reading lies in the linguistic differences between CC and modern Chinese. By watching teaching videos, completing pre-class worksheets, and playing online games, students in this study learned how to use and practice different strategies to interpret difficult words in CC texts. The positive effect of e-learning on motivation was also demonstrated in this study. The improvement in students' self-efficacy is consistent with the view that students will have stronger self-efficacy as they become more capable of using effective strategies and have more successful experiences in e-learning activities (Hewitt, Journell and Zilonka

2014; Akçayır and Akçayır 2018). The interesting and authentic Internet resources and the playful nature of online games also successfully enhanced students' intrinsic motivation (Jefferies and Hussain 1998; De Grove et al. 2012). However, online games design features, such as level progression and leaderboard, did not enhance students' extrinsic motivation as predicted (Estriegana et al. 2019). One possible reason was the insufficient use of online games, because both teachers and students reported that this type of e-learning activity was the least used.

Although CC reading teaching has long been dominated by traditional teacher-centered instruction (Chen 2013; Tang and Sun 2013; Lau 2017), teachers and students generally showed positive attitudes toward e-learning activities in this study. Comparatively, teachers gave higher ratings to all TAM variables than their students. Most of them commented on e-learning activities as useful and interesting, and indicated a high tendency to use e-learning to teach CC reading in the future. This finding suggests that teachers will accept innovative instruction if they believe it is beneficial for their students' learning (Gersten and Dimino 2001). Students showed diverse views on the use of CC e-learning activities. While some students gave positive comments like their teachers, some held opposite views and preferred face-to-face instruction to e-learning. Some researchers have indicated that students who are accustomed to traditional instruction may be resistant to e-learning because it requires more active learning and greater pre-class preparation (Akçayır and Akçayır 2018; Bond 2020; Strelan et al. 2020). As revealed in previous studies (Chi and Chiou 2015; Gao 2016; Lau 2018), Chinese students generally had poor performance in CC reading. Some students may prefer to learn CC reading under their teacher's guidance rather than learning independently in out-of-class e-learning activities. Indeed, the out-of-class e-learning activities designed in the study were used to extend students' in-class learning of the CC texts, not to replace the face-to-face instruction. Considering the strengths and limitations of e-learning, teachers may combine it flexibly with the face-to-face instruction based on their students' needs.

The good fit of the hypothesized model of the study supported TAM as a valid model for understanding user acceptance of e-learning in the context of CC reading. As proposed in many previous TAM studies (e.g., Venkatesh et al. 2003; Edmunds et al. 2012; Scherer et al. 2019), teachers' and students' perceptions of e-learning activities affected their intentional use and, in turn, affected their actual use of these activities. Similar to previous studies (e.g., Lee and Lehto 2013; Teo 2019), perceived usefulness was a core determinant of teachers' and students' acceptance of e-learning, as revealed in the regression analysis and their answers to the open-ended question. Although perceived ease of use was also a significant predictor of behavioral intention in the regression analysis, teachers and students seldom gave comments related to the factor. Since the design of the e-learning activities was simple and easy to use, teachers and students may not have considered ease of use an important issue when they commented on the activities.

It is noteworthy that the results of the study indicated that perceived playfulness and teacher encouragement were more important than perceived usefulness and perceived ease of use in predicting students' behavioral intention and actual use. Since TAM was originally developed to investigate organization members' acceptance of using technology in their workplace (Davis 1989; Venkatesh and Davis 2000), the practical value and difficulty level of a technology were proposed as core elements of the model. When TAM is applied in the school context, students' concerns should be different. Recently, many TAM studies in the field of education have added perceived playfulness/enjoyment in the model and found it to be a very important motivating factor for students to participate in e-learning activities (Moon and Kim 2001; Zacharis 2012; Estriegana et al. 2019). The role of teacher encouragement in student technology acceptance has seldom been discussed in previous TAM studies. Based on the concept of subject norm in some extended TAMs, Cheng (2019) added external encouragement as an external factor in TAM and found it to be significantly related to primary students' perceived effectiveness and perceived ease of use of the visual programming environment. The study supported that this factor was also applicable among junior secondary

students. Since Chinese students usually exhibit poor intrinsic motivation in CC reading (Wei 2009; Lau 2019), their perceived playfulness of the e-learning activities and teacher encouragement should serve as important internal and external motivators, respectively, for them to participate in e-learning activities.

Based on the study findings, two directions are suggested for teachers to increase students' acceptance of using e-learning activities to learn CC reading. First, since perceived playfulness is the most important determinant of student acceptance, it is important to increase the attractiveness and playful elements when selecting and designing e-learning materials and activities, such as adding aminations in teaching videos, selecting Internet resources based on students' interest, and designing diversified types of online games. Considering the heavy workload of front-line teachers, school administrators and researchers should provide efficient technical support for teachers when introducing e-learning to schools. Second, although online games were more interesting than teaching videos and Internet resources, they were the least used type of e-learning activity because, unlike the teaching videos and Internet resources that were designed as compulsory pre-class assignments, students were only encouraged to play online games on a voluntary basis. Previous findings of studies on flipped classrooms have emphasized the mutual support of the face-to-face and online components (Lo, Lie and Hew 2018; Rasheed, Kamsin and Abdullah 2020). Considering students' weak reading ability and poor motivation in CC reading, sufficient linguistic knowledge and background knowledge of the CC texts should be provided in face-to-face teaching to ensure that students have the ability to participate in out-of-class e-learning activities. Teachers also need to follow up students' out-of-class e-learning work to ensure that they have the responsibility to complete the tasks.

7. Conclusion

While e-learning has been widely demonstrated as an effective learning mode across different disciplines and student populations, this study extended the existing research on e-learning by providing empirical evidence for the effectiveness of using e-learning activities to facilitate students' learning in a new

learning context – CC reading –, which has been deeply influenced by the traditional teacher-centered instruction. The study findings confirmed TAM as a valid model to understand user acceptance in the context of learning CC reading, as well as indicated that PP and TE were more important than perceived usefulness and perceived ease of use – the two core determinants of the original TAM – in predicting junior secondary students' participation in CC e-learning activities. This suggests that the nature of the school subject and the students' grade level should be considered when examining factors affecting student acceptance of a technology.

Several limitations of the study and suggestions for future research should be noted. First, only self-reported questionnaires were used in this study. Further research using other forms of data, such as reading tests, interviews, and observations, is needed to verify the effectiveness of using e-learning activities to learn CC reading. Second, only four factors of TAM were included in the model of the study. As many other variables have been suggested in different extended TAMs, more variables can be included to further investigate what other factors may affect student acceptance of e-learning in CC reading. Third, since participation in this study was voluntary, the findings could not be generalized to all students in Hong Kong. Therefore, for cross-replication in future studies with larger and wide-ranging samples is necessary.

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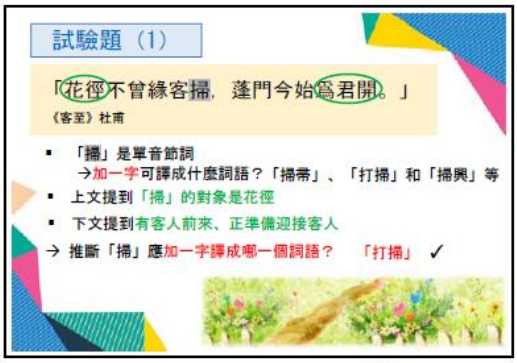
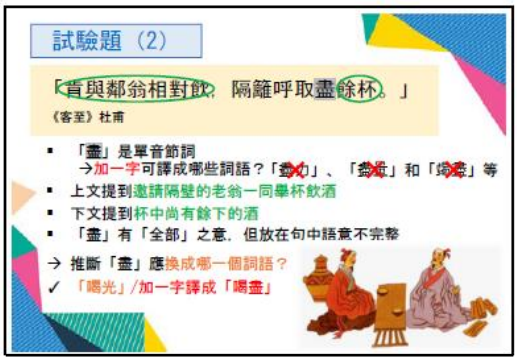
Appendix 1

Examples of PowerPoint slides used in online teaching videos.


換字法 + 上下推斷法（例子）
「原來楊修為人，恃才放曠，數犯曹操之忌。操嘗造花園一所，造成，操往觀之，不置褒貶，只取筆於門上書一『活』字而去。」
《楊修之死》羅貫中
「嘗」是單音節詞
→加一字可譯成「[illegible]試」、「[illegible]新」和「未[illegible]」等詞語
上文提到楊修屢次觸犯到曹操的禁忌 → 其中一次……
下文提到曹操的花園已成功造成
「嘗」在古文中常解作「曾經」
✓ 推斷「嘗」應換成「曾經」


文言字詞策略小錦囊
1
積累：
熟記常用文言字詞的不同解釋，有助迅速選擇正確的字義。
2
讀通：
將推斷出的詞義放在全句句子解釋，看看能否合理解釋全句。
3
結合：
同時結合多種字詞策略，令推斷的詞義更為準確。


試驗題（1）
「花徑不曾緣客掃，蓬門今始為君開。」
《客至》杜甫
「掃」是單音節詞
→加一字可譯成什麼詞語？「掃帚」、「打掃」和「掃興」等
上文提到「掃」的對象是花徑
下文提到有客人前來、正準備迎接客人
→ 推斷「掃」應加一字譯成哪一個詞語？ 「打掃」 ✓


試驗題（2）
「肯與鄰翁相對飲，隔籬呼取盡餘杯。」
《客至》杜甫
「盡」是單音節詞
→加一字可譯成哪些詞語？「[illegible]光」、「[illegible]量」和「[illegible]完」等
上文提到邀請隔壁的老翁一同舉杯飲酒
下文提到杯中尚有餘下的酒
「盡」有「全部」之意，但放在句中語意不完整
→ 推斷「盡」應換成哪一個詞語？
✓ 「喝光」/加一字譯成「喝盡」

Appendix 2

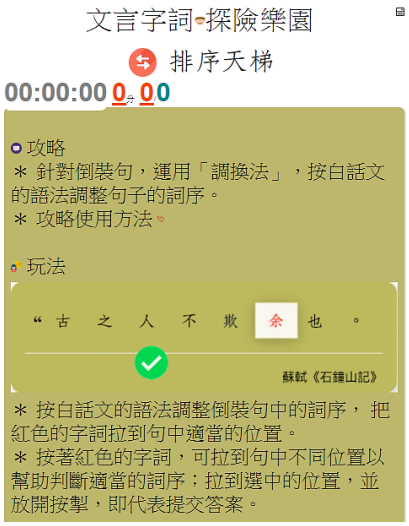
Screenshots of the online game platform.

Cover page of the online game platform.

Tips and rules for the games.

Font Island: Exercises for morphological cues strategy.

Word Forrest: Exercises for adding, changing contextual cues, and syntactic cues strategy.



Ording ladder: Exercises for reordering strategy.

Pronunciation castle: Exercises for phonological cues strategy.

Appendix 3

A worksheet example showing the links of Internet resources and discussion questions for a selected CC text.

單元四：文學欣賞（古體詩）
《木蘭辭》導學案

學習重點：

- 重溫「增」、「換」和「上下」三個字詞策略。
- 認識和運用「字形」、「詞性」、「對句」三個字詞策略解釋課文字詞。
- 認識及掌握古體詩的特點。

課文相關短片：

←① 木蘭辭 課文動畫
https://www.youtube.com/watch?v=s8JfTRrFCzc

② 花木蘭決定要代父從軍 迪士尼動畫 →
https://www.youtube.com/watch?v=hmpIq_CUtuI

←③ 樂府詩選 動畫
https://www.youtube.com/watch?v=rw-SZJDfK2E

小組討論材料

④《獅子山上》電影預告 →
https://www.youtube.com/watch?v=mg7_D_KEI3s

←⑤ 《五個小孩的校長》電影預告
https://www.youtube.com/watch?v=kljpBCpTq-Q

課堂討論問題

1. 《木蘭辭》一詩在木蘭代父從軍的經歷中選取的哪些事件來記述？這些事件刻劃了木蘭的哪些性格和特點？
2. 迪士尼動畫片段呈現了木蘭決定代父從軍和準備出征的過程，當中所敘述的事件與課文第一至二段有何異同？相異之處對木蘭的形象刻劃帶來了怎樣的改變？
3. 《獅子山下》和《五個小孩的校長》兩齣電影分別改編自「包山王」黎志偉和元岡幼稚園呂麗紅校長的經歷，兩段預告片中擷取了哪些有代表性的事件？這些事件塑造了兩位主角怎樣的形象？

以課外電子活動促進學生文言文學習的成效及使用者接受程度

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摘要

本研究旨在探討在課外使用三類電子學習活動（包括網上教學短片、互聯網資源及網上遊戲平台）對促進學生學習文言文的成效以及教師和學生對於這些課外電子學習活動的接受程度。研究共有來自5所香港中學的13名教師及551名學生自願參與。比較學生填寫的前、後測問卷結果，學生採用了這些電子學習活動之後，增加了使用文言文的閱讀策略，提高了閱讀文言文的自我效能感和內在動機，以及較以往更經常參與了文言文的自學活動。本研究同時以科技接受模型為理論基礎探討使用者對這些文言文課外電子活動的接受程度，多元迴歸分析及結構方程模型的統計結果支持本研究的假設模型，證明學生對這些電子活動的觀感會影響他們的使用意願，再進而影響他們的實際使用量，在眾多因素之中，學生對電子活動的趣味觀感和教師鼓勵是影響他們接受和參與這些活動最關鍵的因素，本研究的結果對於在學習文言文這傳統學科採用電子學習這種新的學習模式的可行性有重要的啟示。

關鍵詞：自學　科技促進語文學習　科技接受　動機　策略運用