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Abstract

The aim of the study was to investigate the feasibility of a blended learning approach to enhance students' vocabulary knowledge and vocabulary knowledge retention in English as a foreign language (EFL) classrooms at the tertiary level in Thailand. This was to address challenges in relation to practice and use of English language, rote learning and memorisation, limited one-to-one interaction with peers and teacher, lack of learner-centredness, and low rate of knowledge retention. This study was conducted as a quasi-experimental design, employing the sample from four intact classes with a total of 146 students who registered in an English course at a university in Bangkok, Thailand. The sample was divided into experimental and control groups. The experimental group was exposed to the flipped classroom model, while the control group was taught in the traditional setting. Research tools consisted of an English language proficiency test, vocabulary pre-test, post-test, and delayed test, questionnaire, interviews and observations. The quantitative findings revealed a negative overall impact of the blended learning instruction on the experimental group, and on some particular classes and different academic majors. Gender differences and correlations occurred between language proficiency, vocabulary knowledge and knowledge retention. Qualitative results indicated that students and teachers had positive perceptions and attitudes towards feasibility of the approach. Although the blended learning method is perceived in a positive and feasible way, it may only be applicable for some particular groups or types of learners. Hence, different aspects regarding nature of learners and language learning should be taken into consideration, these include: language abilities, background knowledge, gender, academic majors, learners' characteristics and capabilities, content and assessment, and selective types of technology.

Key words: feasibility, blended learning, flipped classroom, increasing vocabulary knowledge, vocabulary knowledge retention, EFL classrooms, tertiary level

**The Use of Blended Learning to Support
Vocabulary Learning and Knowledge
Retention in Thai Tertiary EFL Classrooms**

Paunluck Puntahachart Saengsawang

A Thesis Submitted in Fulfilment of the Requirement for
the Degree of Doctor of Philosophy in Education

School of Education
Durham University
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Declaration

This thesis is the sole work of the author and has not been submitted previously by any other candidate for a degree at Durham University or at any other University.

Statement of Copyright

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1. Introduction

1.1 Background to the study

This section presents the background to the study, which will be concerned with the importance of vocabulary learning and vocabulary knowledge retention, Thailand's national education policy, issues in vocabulary learning in Thai EFL contexts, and an overview of blended learning in English language teaching.

1.1.1 Importance of vocabulary learning and knowledge retention

Now the dominant global language, English is used to communicate by a large number of people around the world, and is learnt as a second or foreign language in many other non-English speaking countries (Kalra, 2015). It is a literary medium widely used on the Internet, product instructions, advertisements and other relevant media seen in everyday life. It is also seen as a neutral means of communication in multinational workplaces or organisations, including academic institutions. Consequently, awareness of the importance of English language learning increasingly exists in all levels of Thai education, from pre-school to higher education. Apart from an increase in international schools in Thailand, in the past years there have been increases in English programmes organised in public and private educational institutions where English courses and curriculum have been revised to meet the needs of current language learners and to serve more specific purposes of language use in the modern world. At universities, English is taught not only to enhance language skills, but also to be helpful in other courses that are relevant to students' academic majors. For example, language knowledge can assist in reading textbooks, searching for online information, or listening to lectures presented in English. Hence, English language is an important tool for communication, academic study, or other purposes.

For EFL learners, vocabulary is a foundation which is a crucial part of language learning as it supports communication in the target language and takes an important part to perform in the four key language skills of listening,

speaking, reading and writing (Milton, 2013). Thus, lack of vocabulary knowledge can affect or cause difficulties in learners' communication and performance in the second language (L2) or foreign language (FL) contexts. Particularly, it is very important for students at the tertiary level to have adequate English vocabulary skills and knowledge as they are regularly exposed to learning tasks and activities in English, such as reading textbooks or journals, writing reports, giving a presentation, and probably communicating with lecturers in English. With limited or insufficient vocabulary capability, students are unlikely to perform their learning tasks efficiently, and this might create obstacles for them to produce quality assignments in L2 communication (Boonkongsan & Intaraprasert, 2014). It can be clearly seen that vocabulary is a tool to empower English as a Second Language (ESL) or EFL learners to use the target language proficiently and it seems to be important in regard to successful language learning (Schmitt, 1997). Not only is acquiring vocabulary knowledge important but also retaining the knowledge is crucial for future use in a higher level of education or labour markets. As can be seen, the retention of vocabulary knowledge is necessary for students in a way that they should be able to recall or retrieve words they learnt and use this vocabulary knowledge for academic or work purposes. Furthermore, among different subjects, knowledge retention plays not only an essential role for learners' academic achievement but also a foundation in problem-solving or other subjects as well (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013). With knowledge retention, students would be able to apply or transfer the previously taught content in other academic courses, and to achieve their learning objectives as well. In addition, when they work for companies or organisations, knowledge retention is a key factor to maintain competitive advantages and to bring about sustainable enterprise development (Doan, Rosenthal-Sabroux, & Grundstein, 2011; Liebowitz, 2011).

1.1.2 Thailand's national education policy and issues of vocabulary learning in Thai EFL contexts

According to Thailand's national education policy ("National Education Act B.E. 2542 and Amendments (Second National Education Act B.E. 2545)," 2002), knowledge and skills in languages are emphasised as foundational in all types of education, i.e. formal, informal and non-formal approaches. Moreover, supporting the state of learner independence, the act also guided that "*The teaching-learning process shall aim at enabling the learners to develop themselves at their own pace and to the best of their potentiality*" (Chapter 4: section 22, p.10). There has also been enforcement to reform the traditional pedagogical and educational system into one of more of learner-centredness, which means students have been taught in the conventional teaching method that is carried out in a teacher-centred setting where the teacher plays the main role in the classroom as a knowledge giver. Learners in this approach tend to be unable to indicate their needs and expectations in the learning environment in which they depend on the teacher to gain the most of content knowledge (Dueraman, 2013). Consequently, they might lack learner autonomy, critical thinking, problem-solving and other necessary skills for the job market and industries (TeeNee, 2011). As reported by the opinion survey centre of the National Institute of Development Administration (NIDA) poll (Thai PBS, 2014), Thai graduates are viewed as "unqualified", with a low quality of work capacity. The survey results revealed that the problem was mainly based on their focus on completing the degrees rather than their individual potential, and learning with more emphasis on theory than practice, which cannot enable them to meet the job market demands or standards.

In English language learning, Thai learners are seemingly exposed to rote memorisation in a conventional instruction approach. That is, they tend to be taught to memorise new words, by repeating, translating, or vocabulary dictation, which tend to be related to the idea of surface learning (Suwannarat & Tangkiengsirisin, 2012). This is likely to lead them to learn vocabulary without use and practice, and the large amount of vocabulary content is

presumably covered and taught in a limited time (Siriwan, 2007). As a result, the learners are prone to forget or be unable to retain the vocabulary knowledge even in the short term. This is supported by the result of Ordinary National Education Test (O-NET), which is required for Grade 12 students (17-18 years old) for their university admission. The average score percentage of English subject for the academic year 2015 was 24.98%, which was the lowest comparing to other subjects, such as mathematics (26.59%), general sciences (33.4%), social studies (39.7%) and Thai language (49.36%) (Fredrickson, 2016). The average scores of English subject for the academic years of 2016 and 2017 rose slightly to 27.76% and 28.31%, respectively (NIETS, 2019). Announced in 2019, the latest test results for the academic year 2018 showed that the average score in English subject of all grade-12 students was at 31.41%, which ranked the third lowest from mathematics (30.72%) and science (30.51%) ("Average O-Net Scores of Academic Year B.E. 2561 (A.D. 2018)," 2019). Although the test takers' score has appeared to gradually increase since the academic year 2015, students on average scored under 50 per cent in English subject. Therefore, it is likely that the students may encounter English language learning problems during their tertiary study or have difficulties to use the language effectively thereafter in order to suit the demands in employment in business and other industries.

1.1.3 Overview and significance of blended learning in English language teaching

Nowadays the use of computer technology is widely embedded in academic courses as an important instructional component. With computer-based technology, not only is it a simple content delivery tool but also the instrument involved with the learning process to serve students' learning goals (Ringstaff & Kelley, 2002). In previous years, the computer lab accommodated students to work with peers and teachers for language learning at educational institutions (Chapelle, 2003). In later years alongside the widespread use of the Internet, learners have been offered more convenience and opportunities to interact and collaborate with peers or teachers inside and beyond the

classroom, through synchronous and asynchronous communication. As computer technology has changed and become more affordable in the past years, people can possess their own technological devices, e.g. laptops, tablet PCs, or smartphones. Therefore, with these devices, more language learning opportunities have arisen from them which vary from web-based technologies to mobile applications. In English language learning, efforts and practice are required for learners to be competent or achieve a certain level of language proficiency. In English language teaching, there are challenges for teachers to help language learners develop their language skills and succeed in using the language. Likewise, educational institutions need to devote time to cater for learners in terms of resources, infrastructure and instructional technology, to support learning environments and encourage or motivate students to learn effectively (Al-Mahrooqi & Troudi, 2014). This is in accordance with the guidelines in the national education act ("National Education Act B.E. 2542," 1999), that is, technologies for education are required and promoted to accelerate learning capacity and acquisition of knowledge and skills. To correspond with the education policy, academic institutions, from elementary to tertiary education level, are aware of this importance. They have attempted to incorporate the use of computer technology into the instructional process of their courses to optimise learning outcomes. Additionally, the wide use of technology in educational settings seems to have a positive impact on students' learning experience, motivation and interaction (Banditvilai, 2016). However, in foreign language learning, one-to-one interaction with the teacher as in the traditional face-to-face method may still be necessary in terms of contacting or consulting with teacher to gain more interactive and immediate feedback through a personal interaction (Hubackova, Semradova, & Klimova, 2011). Therefore, with the benefits of the use of technology and face-to-face learning environment, the combination of these two methods, so called "blended learning," is recommended and claimed to be able to enhance learning achievement.

Blended learning is defined as “a new approach and mix of classroom and online activities consistent with the goals of specific courses or programs” (Garrison & Vaughan, 2008, p. 6). Sharma and Barrett (2007) also defined that “*Blended learning* refers to a language course which combines a face-to-face (F2F) classroom component with an appropriate use of technology” (p.7), which covers the Internet connection, the use of computers, means of synchronous and asynchronous communication, and web-based tools. The continuum of blended learning proportions varied from a large portion to limited requirements for learners to be exposed to online instruction (Blackboard, 2009). It is probably adjustable based on learners’ needs and capabilities, institutional infrastructure and availability of resources. The blended learning approach offers flexible utilisation of technology-mediated and classroom instruction, which contributes to options in content delivery, assessment, course management, and learning outcomes (Banados, 2006). With the combination of the two main methods, the approach is likely to provide learners with more accessible, flexible and engaging education by exploiting ICTs and availability of facilities accommodated by the institutions (Allan, 2007). In other words, blended learning brings about more convenience, in terms of time and place, for learners to study at their own pace (Tomlinson & Whittaker, 2013), including manageability of class size by the use of interactive technology (Danker, 2015; Roehl, Reddy, & Shannon, 2013; Schell, 2012). With this flexibility, it is advantageous for cost and time savings, and class management for educational institutions (Sharma & Barrett, 2007). Moreover, it is possible and convenient to organise out-of-class learning tasks and a positive instructional environment to increase learners’ motivation, and memory retention capacity for enhancing their academic performance (Granito & Chernobilsky, 2012; Miller, 2009).

The blended learning method is varied with several instructional models outlined in the wider research. The flipped classroom is a type of blended learning method that is widely used in various subjects. The approach “suggests teachers reverse the usual teaching model by delivering instruction

at home (often by using teacher-created videos) -- allowing them to spend more time in class for practice with the idea of creating a more collaborative learning environment” (Stanley, 2013, p. 10). In other words, students are assigned to study recorded content online, which they are supposed to study at home or before the in-class session (Bergmann & Sams, 2012; Roehl et al., 2013). The classroom then becomes a place where students can ask questions, collaborate with peers, practice and receive feedback through tasks or activities (Bergmann & Sams, 2012; Tucker, 2012; Tucker, Wycoff, & Green, 2017). The role of teacher in this setting still involves facilitating or giving feedback during the in-class activities and encouraging students to become more independent learners through out-of-class assignments. This way, not only does the method boost up peer interaction and collaboration (Ebrahimi, 2019) but also students are promoted to engage in autonomous learning and are focused as the centre of learning.

The flipped classroom is therefore claimed to benefit language courses. This is because blended learning instruction encourages learners not only to spend more class time for practice through tasks and activities that they have prepared for, but also supports their autonomous learning by undertaking out-of-class self-study preparation. A range of previous studies in EFL courses employing this instructional method revealed positive students’ learning outcomes and improvement, including perceptions. Students who were exposed to the flipped instruction outperformed and had their language skills enhanced (Alnuhayt, 2018; Alsowat, 2016; Anwar, 2017; Dong, 2016; Guy & Marquis, 2016; Hsieh, Wu, & Marek, 2017; Wang, An, & Wright, 2018; Zhang, Li, Jiao, Ma, & Guan, 2016). Furthermore, in terms of perceptions, learners were seemingly motivated and positive, and were aware of the usefulness and assistance of the method to their learning (Alsowat, 2016; Mehring, 2015; Nanclares & Rodríguez, 2016; Zainuddina & Perera, 2019). Other prior studies related to the blended learning approaches in English language courses have also been carried out in the past years and reported enhancing students’ English language skills and assisting teachers, particularly, in their classroom

instruction. Most of the studies indicated positive results in students' increased knowledge, knowledge retention and learning achievement, while some studies revealed negative outcomes or no improvement. Research on blended learning has tended to focus on the effectiveness of blended learning lessons on vocabulary development and retention of knowledge, including their motivation towards the course, by analysing the findings from students' test scores, questionnaire responses and interviews. Furthermore, the findings were discussed through the aspects of language or vocabulary development, the extent to which learners' knowledge can be retained, and the degree of their attitudes towards the blended learning approach. Apart from these aspects, it is likely that the feasibility of the blended learning method, the extent to which it is practical for learners in the EFL courses, can be explored further from different perspectives. Hence, this study investigates further insights into the extent to which blended learning instruction is feasible to fit in an English language course at a Thai university.

1.2 Rationale and aims

The traditional method of teaching English in Thailand, which has been employed for decades, is teacher-centred rather than learner-centred. In conventional classrooms, lectures are generally used by teachers to allow students to follow content and take notes. Consequently, in this approach, memorising information or facts or rote learning has been a main part of students' learning. As a result, the knowledge they have learned from this method might be difficult to be retained for long term (Granito & Chernobilsky, 2012; Harman & Bich, 2010). The content learnt from this conventional teaching setting may assist students to study for the tests, but does not promote students to elaborate information so sufficiently that they are unable to retain it through a longer period of time (Nuthall, 2000). Moreover, this can bring about a lack of learner-centredness which may prevent students from employing important skills, such as learner autonomy, problem-solving, effective communication, critical thinking, and retention of knowledge for their study and future career. In other words, without these skills, it can cause

failure in learning or cause them to be unskilled graduates, which affects organisations and industries.

In Thailand, the official language is Thai, while English is learnt as a foreign language (EFL). It is not the official language which is generally used within government units, organisations, or industries, but it is probably used occasionally in specific situations, such as meetings, conferences, or correspondence. Therefore, the Thai language is basically spoken and written in everyday life. In other words, Thai students do not use English as their mother tongue and they generally take English courses as a curriculum requirement. With regard to English language learning, vocabulary tends to be a problem for the EFL students in Thailand where students mainly learn English in the classroom and the opportunities to use English language and vocabulary outside the classroom are likely to be rare. For EFL learners, English language courses require some degrees of vocabulary knowledge for the language use and communication. Vocabulary learning skills are likely to be vital and fundamental to be applied through receptive and productive exchanges in order to learn and communicate successfully (Barcroft, 2004). Thus, a lack of sufficient vocabulary knowledge can bring about difficulties in foreign language communication as well (Bualuang, Sinprajakphol, & Chanphrom, 2012; Hógain, 2012). That is to say, vocabulary is a key component of language learning, and with the limited knowledge or lack of vocabulary retention, learning obstacles can occur for students (Coady & Huckin, 1997; Nation, 2013; Yang & Dai, 2011). Thus, vocabulary tends to be the major problem of EFL students in Thailand where English is not the official language which students are infrequently exposed to opportunities to use it outside the classroom (Bualuang et al., 2012; Liangpanit, 2015). Furthermore, with the conventional teaching approach in the EFL classroom where memorising and repeating usually take place, and this may lead to rote learning that causes vocabulary knowledge to be retained for only the very short term (Yang & Dai, 2011). That is, students probably memorise

vocabulary particularly for exams, but could not retain the word knowledge for language use in the long run.

Furthermore, working as an English language teacher at a Thai university for over ten years, I am aware that vocabulary knowledge is an important element in students' language learning, especially when they take other academic courses or for job applications. Apart from their limited opportunities for language practice or vocabulary use outside the classroom, I have also experienced large classes, with more than 40 students per class, which is one of main obstacles for instruction and classroom management. With large class sizes in English language courses at educational universities, the conventional teaching is lecture with limited one-to-one interaction and practice, and there is evidence to suggest that this form of teaching may lead to memorisation, lack of sufficient learning, a decrease in knowledge retention (Lujan & Dicarlo, 2006), which could cause lack of necessary skills for future work. Moreover, as the university has three campuses located in the different provinces, teachers need to commute between the three campuses regularly, which is inefficient in terms of both time and cost. Similarly, from my teaching experience, one of the prominent reasons that students would generally study the English course is to achieve satisfactory grades. With the conventional teaching approach mainly used at the university, they consequently learn and memorise the content to pass the exams or just to get good academic results. Thus, most of the time, after examination, recall tends to fade, and students may not be able to retrieve or use the previously taught content or vocabulary knowledge. When they continue studying other English classes and are asked repeatedly about the vocabulary they learnt formerly, some students show knowledge retention, while others are not able to retrieve much of the vocabulary they have been taught. Occasionally, within a limited-time class period, it is necessary for teacher to spend a certain amount of time to repeat the previous language content that they have been unable to retain (Gaines, 2001). Therefore, this can reflect failure in language learning or their use of vocabulary knowledge, and it can probably cause them difficulties to continue

learning a higher level of content as well (Wolfe, 2001). With these limitations, conventional teaching may therefore lead to ineffectiveness in L2 learning and teaching, which leads to unskilled graduates, and a lack of capacity to meet the needs and expectations of industries and the workplace. In order to cope with this situation, producing appropriate tasks and activities are challenging and essential for teachers. Furthermore, an effective teaching and learning approach should be constructed to assist learners to retain the content knowledge during the course, for the higher levels of education, for their work and career development, or to enable them to be qualified for organisational and industrial standards or expectations. Thus, blended learning is an approach that may offer different outcomes because it promotes a learner-centred approach, which might enhance learners' vocabulary knowledge and knowledge retention, through an emphasis on face-to-face learning and the role of technology.

As technology has been changing rapidly and is extensively used in various aspects of today's societies, information communication technologies (ICTs) have become of important and been strategically used in the classroom as they can integrate additional teaching methods into the learning process. The influences of technology play a vital role in creating opportunities and challenges to teachers, which can benefit both the teachers and students (Redmond, 2011). In addition, students these days have been acquainted with the technology since they were born, and they are able to employ it in everyday life. With their ability and readiness, it could be advantageous for teachers to integrate technology into their course (Advancement Courses, 2016). To be proficient in language skills, technology can also be used to support learning and teaching both in-class and out-of-class as part of the instructional and learning process. Moreover, certain types of learning activities or memory strategies, and using technology to enhance language learning, such as e-learning, computer-assisted language learning (CALL), and online courses, have been widely used. With the benefits of the traditional classroom, such as social interaction, direct assistance from the

teacher or personal contact (Shoeman, 2009), and the rise of using ICTs in education to enhance learning and teaching environments can also fulfil the nature of face-to-face teaching with online methods or blended learning (Redmond, 2011). Garrison & Kanuka (2004) stated, for example, that “blended learning is the thoughtful integration of classroom face-to-face learning experiences with online learning experiences” (p.96). This type of learning applies the advantages of the traditional classroom and online learning activities to create an appropriate learning atmosphere and quality learning outcomes.

To achieve specific learning requirements, blended learning provides the capability to utilise a variety of ICTs in the learning community, such as course management software, social networking sites, discussion boards, video-conferencing, blogs, and other electronic media. This might create both challenges and flexibility regarding time and place for learners that want to work at their own pace or promoting them to learn autonomously (McKenzie et al., 2013). Furthermore, it is believed that in the future blended learning tends to be used increasingly by employing several approaches, such as mobile learning, virtual classrooms, web-conferencing, social networking, and e-resources (The Oxford Group and KINEO, 2013). Hence, based on the advantages of face-to-face and online learning, including the importance of their knowledge retention in vocabulary learning, blended learning is a possible integration of media use or online resources and classroom-based practice to produce efficient learning activities and enhance students' vocabulary knowledge that would also be instrumental in English language learning. Furthermore, apart from supporting students' vocabulary knowledge retention and learning and coping with the problem of the conventional teaching method currently used in Thai tertiary classrooms, the blended learning approach would be a solution to promote students to learn autonomously and to create more learner-centred classrooms. In addition, it corresponds to Thailand's National Education Policy, ("National Education Act B.E. 2542," 1999), that encourages learner-centredness in pedagogical

learning environment and manpower development in science and technology. Hence, with the support of the blended learning approach in an EFL course at a tertiary level, there are three primary aims of this study: 1) To investigate students' increase of vocabulary knowledge; 2) To examine students' vocabulary knowledge retention; and 3) To study the feasibility of a blended learning approach.

1.3 Research questions

A number of previous studies have investigated the effectiveness of a blended learning approach on learners' vocabulary development or knowledge retention, including learners' attitudes and motivation in the blended learning environment. With respect to this study, further faceted explorations are established to examine the feasibility of the blended learning approach in students' vocabulary learning through additional aspects. Therefore, this study sought to answer the seven following research questions:

- 1) To what extent does blended learning enhance students' vocabulary knowledge?
- 2) To what extent do students retain their vocabulary knowledge?
- 3) Are male students' test scores different from female students'?
- 4) Are engineering major students' test scores different from architecture major students'?
- 5) To what extent do students' test scores differ between the classes?
- 6) To what extent are there correlations between students' English language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge and vocabulary knowledge retention?
- 7) To what extent is the use of a blended learning approach feasible?

1.4 Definitions of the key terms

There are key terms used to identify the teaching methods and analyse dependent variables in this current study. Hence, for better understandings to the readers, the definitions of terms are presented as follows.

- 1) **Blended learning** is an approach using the combination of face-to-face teaching method and technology-mediated learning (Sharma & Barrett, 2007).
- 2) **The flipped classroom** is a type of blended instructional model in which students learn some of the classroom content online outside the classroom and apply it to in-class practice or activities. The instructional strategy flips the in-class content to learning outside the classroom via an online platform, and emphasises practice through the in-class tasks and activities (Bergmann & Sams, 2012; Roehl et al., 2013; Tucker, 2012; Tucker et al., 2017).
- 3) **The feasibility of a blended learning approach** is defined as an evaluation of a blended learning approach in terms of practicality and opportunities for EFL learners in the blended learning environment, by interpreting the results from students' attitudes and perceptions and teacher and researcher observations consistent with other feasibility studies in education.
- 4) **English language proficiency** refers to the ability of an individual learner to perform in the English language. In this study, the participants take PET (Preliminary English Test) as the language proficiency test that consists of listening and reading sections.
- 5) **Pre-existing vocabulary knowledge** means the participants' vocabulary knowledge, assessed by a vocabulary pre-test, which exists and relates to the course content at the beginning of the course.
- 6) **Increasing vocabulary knowledge** means the participants' vocabulary knowledge was enhanced after learning through the course, assessed by a vocabulary post-test at the end of the course.
- 7) **Change in vocabulary knowledge** means the level of the participants' vocabulary knowledge that increased or decreased from the beginning to the end of the course, derived from the change in scores between the pre-test to post-test.

- 8) ***Vocabulary knowledge retention*** refers to the degree of participants' vocabulary knowledge that is retained after the course. It is evaluated by a delayed test, one month after the course ended.
- 9) ***Change in vocabulary knowledge retention during the course*** means the difference in participants' taught vocabulary knowledge from the beginning until the end of the course, which is derived from the change in scores between the pre-test to the retention or delayed test.
- 10) ***Change in vocabulary knowledge retention one month after the course ended*** means the difference in the participants' vocabulary knowledge retention one month after the course ended, analysed as the change in scores between the post-test to the retention or delayed test.

1.5 Summary to this chapter

Having introduced and described the overview of this study, this section provides a summary of this introduction chapter. First, background of the study is presented in relation to the importance of vocabulary knowledge and vocabulary knowledge retention, guidelines in the national education policy, issues in vocabulary learning in Thai EFL classroom, and an overview of blended learning. Moreover, rationale, aims and research questions explain research problems, objectives and the extent to which will be looking at in this study. Regarding research methodology, there is brief description of the research setting, design, tools, definitions of the key terms, and limitations of this study. Finally, contributions of the study are described with regard to the national education policy, the university's education action plan, guidelines for English language teaching, and specific contributions as a doctoral study. Table 1.1 shows a summary of this chapter with concise information about each topic.

Table 1.1 Summary of the introduction chapter

Background	Problems	Aims	Research questions 1-7	Setting & Sample	Research design & Tools	Limitations	Significance
<p>Vocabulary as a foundation of language learning</p> <p>Importance of vocabulary knowledge retention for future use in academic study and occupations</p> <p>Guidelines of technologies, learner-centeredness and language knowledge, referred to Thailand's National Education Act</p> <p>Issues in English language learning in the Thai classroom</p> <p>Blended learning to cope with the situation and fulfill the learners' needs</p>	<p>Lecture/conventional teaching method</p> <p>Large class size</p> <p>Commuting to three differently-located campuses</p> <p>Requirements and standards of employers/companies/industries</p> <p>EFL learners' lack of sufficient vocabulary knowledge and knowledge retention</p>	<p>To investigate:</p> <p>the feasibility of a blended learning approach</p> <p>students' increasing vocabulary knowledge</p> <p>students' vocabulary knowledge retention</p>	<p>To look into the extent of:</p> <p>enhancement of vocabulary knowledge</p> <p>vocabulary knowledge retention</p> <p>gender differences</p> <p>differences between the academic majors</p> <p>differences between different registered classes</p> <p>relationships between language proficiency, vocabulary knowledge and knowledge retention</p> <p>feasibility of blended learning instruction</p>	<p>A university in Bangkok, Thailand</p> <p>Participants who enrolled in an English for Industrial Management course (consisting of 4 registered classes)</p>	<p>Consisting of three phases (pre-pilot, pilot and main study)</p> <p>Design for the main study:</p> <p>Quasi-experiment</p> <p>Control & experimental groups</p> <p>Research tools:</p> <p>English language proficiency test</p> <p>Vocabulary pre-test, post-test, delayed test</p> <p>Observations</p> <p>Questionnaire</p> <p>Interviews</p>	<p>No random assignment in quasi-experiment</p> <p>Small sample size of intact classes at one university</p> <p>Dual role of researcher and teacher</p>	<p>Corresponding to the national education policy and the university's educational action plan</p> <p>Help produce graduates with skills and capabilities for business companies/industries</p> <p>Cost and time savings for the university's education management</p> <p>Guidelines to consider when creating a blended learning lesson to optimise students' learning and knowledge retention</p> <p>A warning note to consider the feasibility of blended learning from different contexts and different aspects of language learning</p>

1.6 Structure of this thesis

This study is organised in a linear structure from Chapter 1 to Chapter 6. The introduction to this thesis is presented in the first chapter, and consists of background to the study, a discussion of the rationale, research questions, the research design, and potential contributions of the study. Chapter 2 sets out the literature review of theories and practice related to English as a Foreign Language (EFL) contexts in vocabulary learning, vocabulary knowledge retention, differences in language learning and the potential of blended learning. Previous related studies to EFL learners' vocabulary development in the blended learning environment are also discussed in this chapter. The methodology is then presented in Chapter 3, which explains the methods of collecting data, the selection of participants, the process of data collection and data analysis during the preliminary research phases and the main study. Chapter 4 reveals the results derived from test scores, questionnaire, interviews, and observations from the main study. After that, the discussion of the findings is presented in Chapter 5 based on the research questions. The findings are discussed through the aspects of increasing vocabulary knowledge, vocabulary knowledge retention, gender, academic majors, the relationships between English language proficiency, increasing vocabulary knowledge and knowledge retention, including the feasibility of the blended learning approach. Finally, Chapter 6 presents the conclusion of the key findings and discussion, limitations of the study, and implications and recommendations for future work are suggested in terms of practice and research.

2. Literature Review

2.1 Introduction

This chapter provides a review of the related literature and studies on blended learning supporting vocabulary learning in EFL classrooms and students' knowledge retention. The relevant research work and literature here were examined from a range of primary and secondary data sources as the key bibliographic tools, by the databases accessed through Durham University Library and digital search protocols. The objectives of the search and selection were identified based on the study variables in regard to each research question in the current study: vocabulary knowledge, vocabulary knowledge retention, differences in language learning regarding gender and academic majors, relationships in language abilities and achievement, and feasibility of the blended learning approach. The sources and previous studies were evaluated in accordance with those variables and the contexts of English language teaching. Studies with irrelevant information and data in terms of methodology, reporting results or study focus were discarded. Then, synthesis of the literature was presented through a narrative review in relation to paradigms, learning methods, and processes of memory functions and vocabulary knowledge retention. In addition, there are principles, a theoretical framework, and designs that lead to creating meaningful blended learning lessons and take them into practice that is beneficial in assisting the students to retain their vocabulary knowledge. In the first section, the importance of knowledge retention is investigated in relation to theories of learning that play a vital role in language acquisition and retention. In addition, the process of meaningful learning and knowledge retention, including forgetting are examined to better understand how learners can retain their content knowledge within a meaningful learning context. Then, meaningful and deep learning is presented as it is an element leading to better understanding. Another key area to explore is vocabulary learning in EFL contexts. Regarding EFL learners, this section is presented to overview the importance of vocabulary learning and problems that language learners encounter. Moreover, to be effective in

vocabulary learning for the learners and to retain vocabulary knowledge for the future language use, approaches and techniques towards vocabulary skills are investigated. This chapter then reviews principles of blended learning and its application in education, in the EFL contexts, as well as in connection with vocabulary learning and knowledge retention. Furthermore, an overview of the blended learning design and the flipped classroom model are examined in order to create meaningful lessons for language learners. Another aspect is to explore differences in gender and academic majors which might play a relevant part to students' vocabulary learning in this study. Finally, another purpose of the literature review is to explore related studies of blended learning, in educational courses, that supports vocabulary learning and knowledge retention, in various countries and in Thailand.

2.2 The importance of knowledge retention

Learning leads to changes in behaviour by acquiring knowledge or skills through their experience, study, what is taught, and practice. In the learning processes, learners are exposed to course content, which they are supposed to be able to memorise and retain in order to apply the knowledge for future use, e.g. at their higher level of education or prospective career. Therefore, retention of knowledge is one of the important keys to be successful in learning achievement in various subjects, such as medical science (Jurjus et al., 2014; Vadnais, Dodge, & Awtrey, 2012), mathematics (Narli, 2011), business (Bacon & Stewart, 2006; Koford & Parkhurst, n.d.), and English language (Perez-Sabater, Montero-Fleta, Perez-Sabater, & Rising, 2011). With respect to the working context, it is also regarded as one of the crucial factors for maintaining sustainable performance and gaining a competitive advantage over competitors (Bessick & Naicker, 2013; Doan et al., 2011). Without good retention of knowledge in basic concepts, ideas or facts, students may find it difficult to reach learning objectives, or they will be unable to implement what was learnt to solve problems or apply it as a foundation into other subjects (Dunlosky et al., 2013). In Thailand, knowledge retention is also a pivotal part of learning. For example, in a science classroom-based study, Panijpan,

Ruenwongsa, and Sriwattanaarothai (2008) stated that when asking students about fundamental science concepts or how to apply them into other situations, some of them showed problems in knowledge retention by giving some responses, such as silence, long pauses, saying 'yes' or 'no', and unclear answers. The researchers (ibid.) also added that many of them had the surface content learning to be able to perform well for the test, and immediately forget the learnt information after the exam. Due to these problems, students might lack necessary skills or knowledge for other following courses or higher level of science development. In the same way, language learners, especially in the EFL classroom, should be able to apply language functions or content they learned previously. That is, retention of language or vocabulary that was learnt is very important for language learning and lead to knowledge transfer and recall for future use. In this respect, cognitive learning might play an important role for the learners' knowledge acquisition and structure in a meaningful way to boost their retention of the knowledge. Hence, regarding knowledge retention, related theories of learning will be discussed in the next section.

2.2.1 Memory systems and cognitive learning

Having stated the importance of knowledge retention towards learning and knowledge transfer for the future use, we can now turn to investigate theoretical learning perspectives towards retention of content knowledge. As suggested that learning involves changes in behaviour over a period of time through experience or study, to acquire complex content knowledge, learners are probably engaged in a constructive and meaning pedagogical setting which is related to their memory systems and cognition through the learning process.

Cognition is fundamentally the nature of a learning process or information processing that brings about construction of knowledge. It involves brain functions and capabilities, pertaining to the aspects of thinking, reasoning, and perceiving new information. With this respect, memorisation plays a crucial part in cognition, by being divided into main stages of acquisition, retention, and retrieval of information or content (Anderson, 1995). Through the learning processes, memory is essential for the perception and retaining information of

something or objects by reconstructing relationships or associating it with existing knowledge (Dubuc, 2002a). Furthermore, cognitive learning involves memory systems which mainly consist of short-term and long-term memory (Skehan, 1998). *Short-term memory* or sometimes used interchangeably with *working memory* can store brief or limited information, or a small number of items. The working memory is compared as an executive or temporary storage unit to generate the subsequent output. Information basically resides inside the short-term memory for a limited duration because the information can deteriorate quickly as time or delay increases (Peterson & Peterson, 1959). To present a vivid process of the memory systems, Figure 2.1 presents the stages of how memory functions, starting from input through visual or auditory perceptions to the stages of short-term and long-term memory.

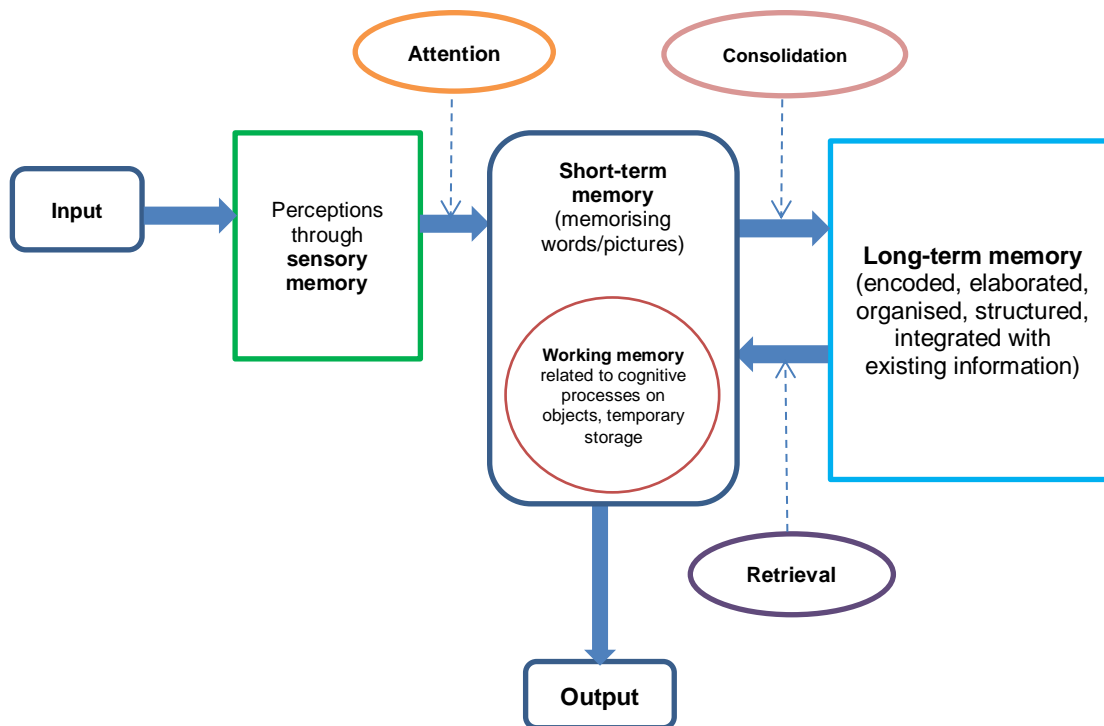


Figure 2.1 Memory systems

At the perception through *sensory memory* (either by visual, auditory, or other perceptions), it contains limited capacities for storing (new) information, depending on *attention* or *concentration*, which can be lost without encoding in

a brief period of time because the information can decay (Anderson, 1995). As a consequence of attention and encoding, the perceived information is likely to be stored more stably into short-term memory which is presumably phonic-related, e.g. remembering words or pictures, names, or numbers. As stated previously, working memory, executively taking part in the short-term memory, functions cognitively for information storage, for example, when a person talks about words or pictures that are currently shown, or when an interpreter translates the sentences that are just heard into another language. In order for information to be retained or stored permanently in the *long-term memory* for later or future use, consolidation is usually required. That is, in the long-term memory where the meaning of an item representation is primarily concerned (Anderson, 1995), information needs to be encoded, elaborated, organised, and structured.

The cognitive theory of learning involves the process of learning in human internal mental structure, e.g. sensation, perception and memory systems, which may help teacher to understand learners' individual differences and their knowledge construction (Mitchell, Myles, & Marsden, 2013; Wijayanti, 2013). The theory concerns three fundamental aspects of learning: "how knowledge is developed, how knowledge becomes automatic and how new knowledge is integrated into an existing cognitive system of the learner" (Takač, 2008, p. 26). McLaughlin (1987) also added that through the process related to these three aspects (structuring and connecting new knowledge with the existing knowledge) could enhance the mastery in language learning. Furthermore, cognitive approaches engage learners in the language acquisition and learning process, such as applying grammatical rules, word choice, and language use in context (Gitsaki, 1998), and Felix (1981) emphasised that cognitive learning mainly concerns vocabulary learning and meaning in language development. Moreover, cognitive approaches tend to play a significant role in second language acquisition by applying learning strategies (Takač, 2008). Learning strategies in cognitive learning support mental processes in acquiring L2 knowledge through interaction and practice or repeated use to restructure it

into the long-term memory for future use (Ellis, 2000; O'Malley & Chamot, 1996). The examples of useful cognitive strategies for language learning are elaborating and grouping, that is, relating newly learnt information to existing knowledge and organising it (Gu, 2018). Budaya (2010) suggested more learning strategies related to cognitive theories to deliberately manipulate learners' inner competence to improve learning, such as organising new knowledge, summarising meaning, guessing meaning from context, and using imagery for memorisation. The emphasis of cognitive approaches is that learners are required to be able to create meaningful and coherent representations of knowledge, possibly by connecting new information with existing knowledge in a meaningful way which, to some extent, benefits learner's recall or retention of knowledge in the long term (Livingston, 2003). Without connecting new information with prior knowledge or experience, learning might not be successful or the new information may be dissociated, or may be applied ineffectively in new tasks.

The theoretical framework adopted in this research is consistent with the cognitive theory of Vygotsky's social constructivism which involves learners' cognitive learning processes through practice (Langford, 2005) and encourages deep learning (discussed later in 2.2.3) through interaction, collaboration, scaffolding, useful feedback, and relating new information to their existing knowledge (Desierto, De Maio, O'Rourke, & Sharp, 2018; Hermida, 2015). Regarding classroom applications, this theory also views that, to develop learners' cognitive skills, facilitation or guidance from the teacher and the use of technology or tools should be provided to them, and interaction with peers or cooperative activities could be of help in developing their skills and learning strategies (McLeod, 2018). In second/foreign language learning, the cognitive approach of social constructivism could foster the language learning through interactive pedagogical practices and support from teacher and peers (Yang & Wilson, 2006). In the blended learning environment, the cognitive pedagogical approach not only takes part in EFL learners' cognitive or memory functions through practice and interaction along with teacher facilitation and

peer collaboration, but also is supported by the use of technology that bring the learning atmosphere challenges, excitement and enhancement of their learning capabilities.

To increase students' learning capabilities, factors within a positive learning context are necessary to be created, such as an appropriate room environment, motivation, a suitable instructional practice, and proper-selected technology. In addition, learners might be facilitated by teacher's guidance with some useful learning strategies, such as categorising, mind-mapping, and organising (McCombs & Miller, 2007). Moreover, to store and retain knowledge in the long-term memory, it requires a period of time for storage, such as rehearsal or repeating, without interference of further new knowledge. Otherwise, it is difficult for items to be remembered, and the information must be stored in the short-term memory repeatedly to build neural connections (Tri, 2016). With rehearsal or repetition, the information from short-term can be slowly transferred to the stage of long-term memory where the information is recorded and able to interact with new material at the short-term memory stage (Anderson, 1995; Skehan, 1998). Rehearsal is, thus, claimed to boost the short-term memory to keep the information or knowledge active, and to avoid decay or loss (Friedenberg & Silverman, 2016).

Some studies lend support to rehearsal towards memory retention, recall, and retrieval. For example, a rehearsal called *retrieval practice*, which is the process of studying & recalling, and re-studying & second-time recalling, was found to be effective in recalling and retrieving the content knowledge, and to be more advantageous and supportive towards learners' conceptual learning than the elaborative method, which means to encode the material content with well-structured, meaningful and conceptual representations of knowledge (Karpicke & Blunt, 2011; Karpicke & Roediger, 2008). Furthermore, Woodward, Bjork, and Jongeward (1973) investigated two types of rehearsal for short-term (rote non-associative rehearsal) and long-term memory (active associative rehearsal) could be done in a distinctive way, that is, the rote non-associative rehearsal could be employed to maintain items in short-term memory, or to

transfer them into long-term memory. While active associative rehearsal may be used to improve the retention of information in the long-term section, some studies revealed that rehearsal did not result in improved recall and knowledge retention. For instance, Glenberg, Smith, and Green (1977) studied rehearsal of numbers and words at particular intervals. The subjects were found to be able to recall them slightly better, with a weak effect of the amount of rehearsal towards recall. Furthermore, a more recent pilot study by Finnesgard, Aho, Pandian, and Farley (2014) investigated the modality of rehearsal in a training course, by rehearsing before the training sessions, and using hands-on practice and video presentations. It was found that the rehearsal activity did not significantly affect the trainees' knowledge retention due to, perhaps, time limits of the rehearsal sessions. Therefore, to retain and recall the content knowledge, a particular and well-designed rehearsal is required to be created to support all through the course or subject, within the appropriate time intervals.

2.2.2 Meaningful learning, knowledge retention and forgetting

Regarding cognitive learning related to the knowledge retention discussed in the previous section, appropriate learning processes need to be applied into the environment, allowing content to be learned and taught in a meaningful way in order for learners to achieve their goals and gain satisfying outcomes. Hence, apparently, the way the information is processed probably caused a positive effect in memorisation, recall, or retention.

2.2.2.1 Meaningful learning processes

To begin with, according to cognitivists' theories of information processing, in acquiring new information or ideas into the assimilation process, the new input or idea (a) is connected or assimilated into established or anchoring ideas (A). In other words, in this process, the new idea (a) must be interacted with A to derive meaningful learning or understanding output, as shown in Figure 2.2.

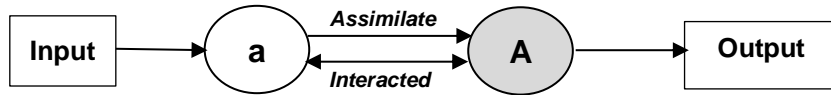


Figure 2.2 Assimilation process

Ausubel (2000) explained profoundly how knowledge is acquired, that is, ‘meaningful learning’ takes a very important part in the acquisition and retention of knowledge. The basic principle of this learning, called ‘derivative subsumption’, is related to cognitive structure that contains relevant existing or prior knowledge to new knowledge. Prior to the meaningful learning, ‘representational learning’ occurs as a way, similarly to ‘rote or repetition learning’, to learn names or arbitrary and non-arbitrary words. With a higher-level of learning, which involves superior cognitive functions of abstraction and symbolisation, ‘concepts’ or ‘superordinate and combinatorial learning’ are defined to bring about understanding, classification, indicating similarities or differences, through learners’ direct experience or existing knowledge. Acquiring concepts leads to “the meaningful reception of declarative proposition and for the generation of meaningful problem-solving propositions” (ibid. p.2). Hence, rote or memorisation learning is opposed to the meaningful reception process as memorising does not result in meaningful associations into learners’ cognitive units. However, in some learning situations, rote and meaningful learning can occur simultaneously or successively to each other. For example, when learning to use coins for shopping, one probably needs to memorise the relevant shape or size of each coin to its denomination before being able to spend it actively in real situations. Although rote learning is claimed to sometimes happen during the meaningful reception, due to its nature of memorisation, meaningful learning and achievement cannot occur in rote learning. Moreover, rote learning content can be internalised, but without a great deal of overlearning, it can only be retained over short periods of time and can interfere with previously learnt or coexisting similar content. On the contrary, meaningful learning is a more active process which, as mentioned that it relates existing knowledge to new ideas, is concerning with reformulation

of substantially meaningful learning materials, and can lead to analogies or contradictions between new and established concepts.

To provide a vivid explanation of the assimilation of meaningful learning, processes or phases of knowledge acquisition through the cognitive aspects, are shown in Figure 2.3.

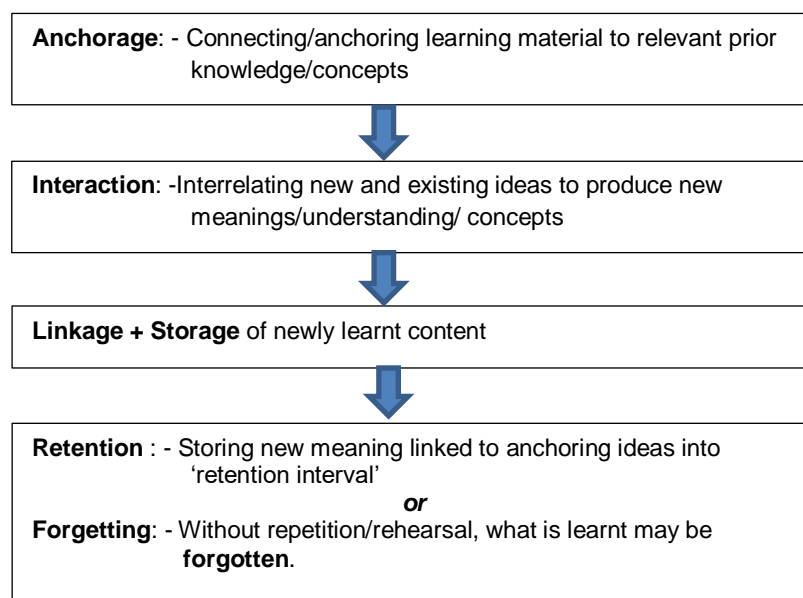


Figure 2.3 Assimilative processes of meaningful learning

Figure 2.3 represents the assimilative processes of meaningful learning, that is, at the anchoring stage, learners' new content knowledge is related to their prior or existing ideas to bring about emerged meaning in the interaction phase where unexpected new meaning is connected to memory, generating understanding and concepts. After that, the newly learnt knowledge is linked to anchoring ideas, to become more stable, and stored into the retention interval. Without repetition or rehearsal, however, what was previously learnt is likely to be forgotten. Furthermore, as discussed by Ausubel (2000), the retention stage can be affected by cognitive, motivational, social and personality variables, including learning disturbance and suppression, which can cause forgetting. Therefore, in order to increase short-term or long-term retention, some factors need to be considered as summarised in Figure 2.4.

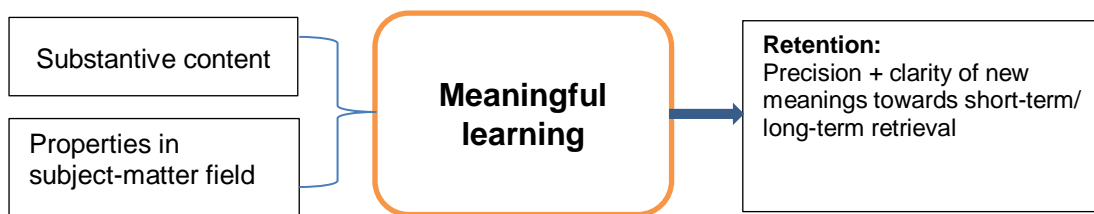


Figure 2.4 Principal factors influencing meaningful learning and retention

Figure 2.4 presents the principal factors that influence learners' cognitive structure towards the meaningful learning process and retention. To generate precision and clarity of the new knowledge, content structure, organised material and language skill should be taken into consideration. In other words, regarding learners' cognitive structure, it is important to stabilise, organise, and clarify concepts or principles to maximise learning and retention, which can also lead to transfer. Moreover, during the meaningful learning process, language is considered important as it is an integral and functional element in thinking. Hence, to influence the learners' cognitive structure, some disciplines, such as giving explanatory or unified presentation, presenting methods, testing, program design, and logically meaningful materials are vital to be deliberately provided.

2.2.2.2 Retention processes and forgetting

Once the content or knowledge is assimilated to a learner's cognitive structure, the retention of knowledge is very important for learners to maintain the content they acquired or are taught in the long run. Therefore, the retention processes, along with recall and retrieval of the information will be discussed in this section. Furthermore, the issues of forgetting, such as how it usually happens and causes, will be raised concurrently.

Types of knowledge that are concerned with the long-term memory are mainly comprised of *declarative* and *procedural* knowledge, which are presented to learners for reception and understanding (Biggs & Tang, 2011) and play an important part in the cognitive structures and learning processes (Anderson, 1983). First, *declarative knowledge*, so called propositional or explicit

knowledge, generally pertains to information, facts or events that is arbitrary, symbolic, or verbal through, such as texts or lectures. According to Friedenbergr and Silverman (2016), within learners' cognitive structures, students play a receptive role to incorporate the knowledge meaningfully, this type of knowledge probably requires deliberate recall. Another type of knowledge is *procedural or functional knowledge* that is memory for skill. It can proceed without conscious recall that brings about actions or performances that are established by understanding. Therefore, this knowledge is not only perceived internally, but also it functions so as to apply for work or in a professional context. Although it may be forgotten occasionally, it can be recalled thereafter. Presumably, these types of knowledge are underlying in the learning process where it also might be effective in knowledge retention. The process of retention regarding declarative and procedural knowledge will, thus, be presented and discussed in the following section.

As can be seen, *declarative* and *procedural* memory or knowledge which incorporates in the long-term memory, plays an important role in the learning processes and in recall or retrieval of information. Furthermore, in the view of language learning, declarative knowledge allows learners to describe or state the rules and meanings; on the other hand, procedural knowledge encourages them to use the language by applying the rules or meanings they learn (Lojova, 2009). With this respect, to gain a positive increase in the retention in language learning, the process of knowledge retention, suggested by Ritter, Baxter, Kim, and Srinivasmurthy (2013) consists of three stages of different learning mechanisms and degrees of forgetting due to lack of use, as shown in Figure 2.5. The process of retention shows that a declarative form of knowledge engages in every stage of learning, but as the procedural knowledge gets involved, the retention tends to be developed. In the first stage, when learners gain solely declarative knowledge, it tends to be forgotten easily due to lack of use, and can cause inaccuracy or failure to do the task.

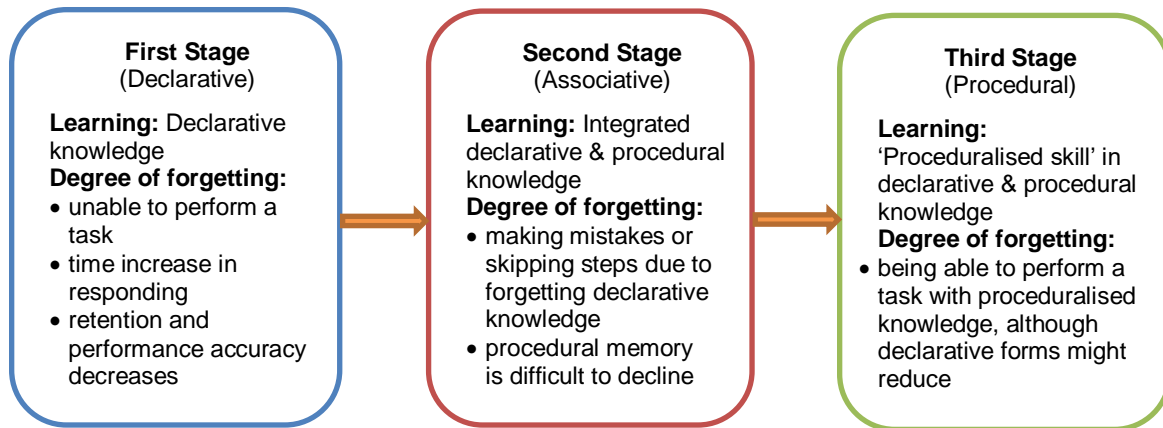


Figure 2.5 Process/Stages of retention

However, if both declarative and procedural forms of knowledge are represented and associated with each other, in the second stage, learners are still able to perform the task, although the declarative form of knowledge probably decays at some rates because of various mixes of task. Hence, to activate the declarative memory and support the procedural knowledge, practice or training is probably needed. Finally, despite the involvement and a possible decrease of declarative knowledge at this stage, the procedural knowledge, which becomes 'proceduralised' mainly, stimulates learners' performance without adding new declarative information as proceduralised knowledge is likely to retain in the long term. In addition, to be able to retain the content knowledge, using environmental, cognitive, or emotional contexts to relate the information or knowledge, or relating it to pre-existing knowledge considerably assists to store it into the long-term memory. Consequently, in the long run it is possible to recall or recognise the information with high activation, or even when encountering new materials or interacting with new knowledge (Dubuc, 2002a; Skehan, 1998).

However, memory systems can be affected by a range of factors: concentration, motivation, emotional states, and contexts (Dubuc, 2002b). As time passes by, memories are possibly decreasing due to interference (new or other memories intervention which affects the loss of previous information that is learnt), and limited appropriate cues to retrieve the content learnt in the past (Anderson, 1995; Bacon & Stewart, 2006). Furthermore, another factor

affecting the memory is skill decay (Arthur, Bennett, Stanush, & McNelly, 1998) which refers to “the loss or decay of trained or acquired skills (or knowledge) after periods of non-use” (p.58), and this skill decay or loss can lead to “absent or inadequate feedback” (p.59). Moreover, with the pressure of striving to pass tests, teaching students to memorise and repeat word definitions or spellings may help them to do the test, but does not help them retain information (Wolfe, 2010). A certain factor which similarly and directly affects retention in the memory systems is *forgetting*. Forgetting is a crucial occurrence towards the memory functional stages, and usually happens to learners when acquiring knowledge and skills (Lindsey, Shroyer, Pashler, & Mozer, 2014). In addition, forgetting results in a decreased retention rate. In a classic study of retention rates by Ebbinghaus (1913, cited in Anderson, 1995), it is stated that the stronger connection of memory, the more the retention interval increases. According to the assimilation process, forgetting probably occurs during the process; that is, while new ideas or concepts are being developed, with possible intervention or conflicts of meanings occurred, the meaningful ideas or concepts might soon not be retrievable from the anchoring knowledge; hence, they are soon forgotten. To better understand this idea, the process of forgetting is presented in Figure 2.6.

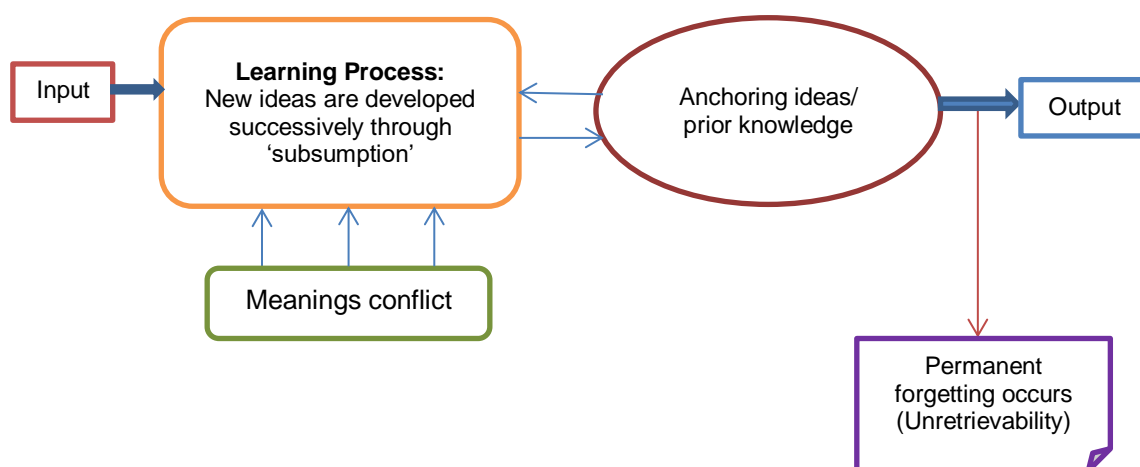


Figure 2.6 Process of forgetting

From these meaningful learning stages, forgetting possibly occurs during the process while new ideas and concepts are processing or interacting with the prior knowledge. Due to several underlying causes of forgetting, Ausubel (2000) summarised them by separating into the phases of 'meaningful learning' and 'retention and reproduction' as follows:

Table 2.1 Causes of forgetting

Meaningful learning phase	Retention and reproduction phase
<ul style="list-style-type: none"> • Material or instruction is not logical, meaningful, clear, or relevant to learners' cognitive skills of knowledge, and is containing rote learning content. 	
<ul style="list-style-type: none"> • Content interference, misconceptions 	
<ul style="list-style-type: none"> • Lack of attention or interests 	<ul style="list-style-type: none"> • Lack of motivation to remember
<ul style="list-style-type: none"> • Insufficient amount of overlearning, practice or rehearsals 	

From Table 2.1, it can be seen that both phases share most of the similar causes of forgetting, except in terms of attention or interests which might subsequently affect knowledge retention. Hence, at times, learning might be developed, but forgetting takes place rapidly if the new subject or material by itself is not relevant, unclear, not meaningful, or if there is a lack of sufficient deep learning (Lujan & Dicarlo, 2006) to the learners' cognitive structures. Furthermore, forgetting can occur during the learning process due to successive intervention of additional content or ideas. This is also congruent with Bacon and Stewart (2006) in which forgetting was likely to be caused by, firstly, loss of memory or decay over the time period or led by other subsequent content interference with earlier knowledge. Regarding the learners themselves, without their concentration, motivation, and sufficient overlearning or further practice, the process of acquiring and retaining knowledge might not be effective. The idea of overlearning also corroborates the meaningful learning concepts of Hintzman (1978); that is, due to forgetting over time, the meaningful learning process and overlearning or continuous practice brings a positive effect to the retention of knowledge and transfer.

Regarding forgetting in higher education, several studies indicated that students tended to forget what they had learned during the last year of their

study, particularly when what was previously taught in early courses does not take a crucial part in their later courses (Miller, 1962; Richardson, 1993; Swanson, Case, Luecht, & Dillon, 1996). This might imply that study or knowledge retention periods are probably taking part upon their forgetting. A study, then, investigated the rate of forgetting by observing the effects of multiple repeated tests after a single instruction, versus repeated instructions without any tests (Wheeler, Ewers, & Buonanno, 2010). The results showed that, within a short retention interval, the experiment of repeated instruction with no tests brought a more positive rate of recall. However, when the retention interval was likely to be longer and content seemed to be forgotten, repeated tests were found to be more positive towards recalling. The conclusion was consequently drawn that the multiple recall tests could play an important role in knowledge retrieval, and the repetition of learning was likely to boost up knowledge acquisition. Hence, it is probably a good idea to offer students consecutive training or courses before they graduate or during their study condition to increase their knowledge acquisition and maintain their retention. Furthermore, as can be seen that knowledge retrieval is related to forgetting, providing learners retrieval cues such as through recall tests with appropriate timing is probably a way to decrease the rate of forgetting.

2.2.3 Meaningful and deep learning to increase knowledge retention

Having explained the processes of meaningful learning and knowledge retention above, we can now turn to the discussion of types of learning, surface and deep approaches, that affect students' knowledge acquisition, and in order to organise the instruction in a meaningful way and enhance the retention of learners' knowledge. Differences may occur in the quality of learning as students perform their learning in different ways. Haggis (2003) and Draper and Waldman (2013) mentioned surface and deep learning which students generally get engaged in learning settings. Basically, the surface learning process is related to taking and memorising points of facts or information, which is in association with 'rote learning' or 'repetition', while deep learning pertains to comprehension and taking the information into a deeper angle or

existing cognitive structures, which could be connected to other experience or knowledge to lead to better understanding. In addition, students who are exposed to the surface learning approach are likely to emphasise the texts and much on memorising, whereas in deep learning processing, they try to assimilate meaning of the text (Casea & Marshall, 2004). Furthermore, there are some points of differences between both types of learning. Firstly, surface learning may not reflect ideas or meaning behind the facts, as it focuses on memorisation and recitation, perhaps without understanding, so various points of argument are not probably raised and comprehended. In addition, assignments are generally repetitive; hence, learners are sometimes less motivated, and strive to pass tests. On the other hand, deep learning connects what is learned to previous knowledge or experience, or other resources, along with critical thinking skill. Therefore, regarding creating such a learning environment for EFL learners, new ideas and arguments tend to be created, understood and retained. Deep learners are intrinsically motivated to learn, and able to identify the knowledge structure as well as understand the profound meaning inside of what they learned. Concepts of learning hierarchically consist of quantity of content or knowledge to learn, memorising, retrieval of information for future use, the reflection of meaning learned from the information, structured understanding process, and becoming a deep learner (Haggis, 2003). To better indicate the differences between surface and deep learning, Lublin (2003) summarised the characteristics of surface and deep approaches in Table 2.2.

Table 2.2 Characteristics of surface and deep learning approaches (Lublin, 2003)

Surface Approach	Deep Approach
<ul style="list-style-type: none"> • Attempting to repeat what is learned • Memorising the content to, e.g. pass the exams • Utilising rote learning • Putting much concentration on details • Unable to identify principles from examples 	<ul style="list-style-type: none"> • Attempting to understand the subject or material • Being interactive with the content by making use of evidence and evaluation • Relating ideas in a broader view • Being interested in the subject itself • Interacting between new ideas with the

Surface Approach	Deep Approach
<ul style="list-style-type: none"> • Depending too much on the course requirements • Being motivated to pass the exams 	<ul style="list-style-type: none"> existing knowledge, or concepts with experience • Being independent from the course requirements

From Table 2.2, to summarise, learners who are exposed to the surface approach seem to be more concerned about the exams and course requirements. Furthermore, they tend to make use of a rote learning method, pertaining to memorising or repeating information, and concentrating on too many details; consequently, they might lack concepts and fail to distinguish principles. Unlike the deep approach, it is relatively concerned with the meaningful learning process in a way of putting attempts to understand, interact with and evaluate the content, engaging new information with existing knowledge, and developing concepts to gain what is beyond the course requirement. Marton and Saljo (1997) added that surface and deep learning may also be influenced by two types of motivation. First, intrinsic motivation, without anxiety or fear, plays an important part for deep learning, as it draws learning interests to master a subject or content -- not generally memorising to pass tests. Meanwhile extrinsic motivation, which emphasises quantity or remembering of text or tasks in themselves to pass the tests or achieve good grades, is rather related to surface learning. However, these two motivations of students seem to differ individually due to their particular characteristics (Ryan & Deci, 2000), and they can affect students' degree of learning diversely. Furthermore, learners' intentions are different and can be a crucial factor towards deep or surface learning. In other words, the intentions in deep learning are likely to be related to learners' involvement in the learning process, such as attempting to understand or evaluate the subject matter, while students who are exposed to surface learning tend to focus on the motivation of memorisation to take an exam, without interests or engaging profoundly into understanding the learning content (Lublin, 2003).

Hence, for better knowledge retention in language learning, it is likely to be a better idea of focusing rather on (deep) understanding than memorising

because learning is not just a receptive and memorising process, but with lecture methods, extensive or loaded content, and time limits, deep understanding leading to critical thinking or problem-solving is probably left behind (Lujan & Dicarlo, 2006). Biggs and Tang (2011) suggested that concepts and understanding are crucial factors of knowledge and learning, which learners can perform differently in a better way, and levels of understanding are varied in a way that teachers should intend to consider designing learning outcomes. Furthermore, knowledge at the rote learning level could not transfer, so teaching for deep understanding rather than learning facts would cause learners to apply knowledge in new situations or contexts (McTighe & Seig, 2014). Therefore, they suggested teaching approaches for understanding, that is to engage learners in meaning formation in order to build up their own comprehension or concepts, such as questioning, idea analysing and interpretation, making inferences, and problem-solving. Another suggested approach is teaching learners to understand core concepts and be able to transfer their knowledge in real situations. That is, teaching methods and assessments are the key to creating tasks, models, and opportunities for students to be exposed to meaningful or authentic contexts, with proper and ongoing feedback. Similarly, learning does not occur passively or simply by listening to the lecture, memory-testing assignments, or basically asking-answering questions, but engaging in active learning with sufficient time provided is likely for learners to understand and increase their retention interval longer (Cortright, Collins, Rodenbaugh, & DiCarlo, 2003; Lujan & Dicarlo, 2006). Furthermore, the similar point of feedback to McTighe and Seig (2014) is that teachers are recommended to employ quizzes or tests that provide an opportunity for students to gain immediate feedback in order for them to know what they have learned or how deeply they have understood.

Taking learning approaches into account, types and characteristics of learners are also considered important as they can bring about influences on deep or surface learning. Learners' preferences have been investigated in different ways, such as sensory channels (learning by: visualization, listening,

reading/writing) (Bielicke, 2012; Loob, 2001), or using demographic data, motivational approaches, academic preferences (Hu, Katherine, & Kuh, 2011), and cognitive styles, which pertains to cognitive and motivational factors related to learners' knowledge construction (Loob, 2001). In order for the learners to acquire and retain this knowledge, their active engagement within the cognitive learning process is considered important, i.e. using a computer-based platform for exercise practice or simulations with auditory components (listening to stories/information), which relate to visual information (graphics or animations) and active physical control over computer devices (Herring, 2012). Likewise, to expose students to deep approaches, which lead them to positive retention of knowledge, it is recommended for them to get involved in collaborative and communicative tasks and assignments (Ramsden, 2003). Hence, Garrison and Vaughan (2008) suggested some guidelines and assessment, employing advantages of the online platform to encourage deep learning or understanding, such as discussion forums, peer evaluation or feedback, or self-assessment. That is, using these methods, students are given opportunities to practice and use the target language by communicating and taking part in the online community and to share their electronic pieces of work, and able to share or reflect their critical opinions and inquiries towards themselves and between their peers, facilitated by instructors. Consequently, apart from being motivated and gaining the sense of belonging to the thread or community, they are able to learn through the discourse, reflections, and evaluation. Another relevant study of giving feedback in an English writing course (Alvira, 2016) confirmed a positive result and writing improvement from having students engage in both written and electronic (using *Screencasts* software to produce oral and video comments on students' writing) formats. The researcher also stated that providing feedback in such formats encouraged them to have increasing autonomous learning skills, better motivation, and improved writing skills, such as structure, grammar, and coherence. Therefore, it is likely that deep and positive learning can be influenced by some cognitive factors, such as motivation, learner intentions,

assessment, and teaching, by incorporating collaboration, the teacher's or peer feedback, and self-evaluation through classroom or online settings.

With respect to assessment, it can also affect these types of learning; that is, surface learners are likely to adopt approaches, such as memorisation or repetition, probably achieving good scores for tests. Unlike deep learning, the understanding and assessment of the learning process are emphasised in accordance with learning aims (Biggs, 1999) and may lead to better knowledge retention, and teaching also has influence over the types of learning. Teaching conceptions are varied in some ways. Firstly, surface learning occurs when teacher-centred or content-oriented method is applied. That is, students' ability and their content knowledge, which is received from teacher and in accordance with the course syllabus, are measured through assessments to view their outcomes as well. Meanwhile, a student-centred or learning-oriented approach is adopted in deep learning process where teachers act as a students' guide towards their understanding of what is learned or taught, which relies most on their responsibility. Hence, teaching methods and assessments are varied and incorporated to develop the understanding process. Furthermore, a student activity-focused method, which lies between the ones mentioned above, provides active and meaningful learning assignments or activities, along with efficient learning skills development. However, teacher's monitoring is still maintained to view their knowledge acquisition process. Therefore, to expose students to deep learning approaches, appropriate teaching methods should be investigated to develop students' understanding and to increase their learning outcomes (Entwistle, 2000).

Therefore, in a pedagogical setting, surface or deep approaches seem to have some distinctive characteristics. The surface learning approach is probably inevitable for some reasons, that is, sometimes it tends to be deployed by some students as it might be suitable for them to reproduce authentic learning or what they have learned, or to memorise the content for exams. Therefore, the material learned, through this approach in the long run, is probably soon forgotten (Ramsden, 2003). Hence, it may be advantageous to expose

students to the learning setting which is able to relate them to the *real contexts* that represent to them what and how they learn, not the quantity they can remember. Furthermore, a learning approach should be able to promote their capabilities of relating concepts or topics to the way that an expert in that subject can do. Hence, the deep approach tends to be a better idea for understanding learning materials, a subject, concepts, and professional application. In addition, it should lead to a positive change and superior outcomes, and learners' ability to apply their knowledge to new situations (Marton & Saljo, 1997).

Ramsden (2003) suggested three levels of students' learning in higher education which should focus on understanding and applying what is learned for future use into the *real world* or situation, as shown in Figure 2.7. Levels of how students learn are presented from 1 to 3, at the increasing power of learning.

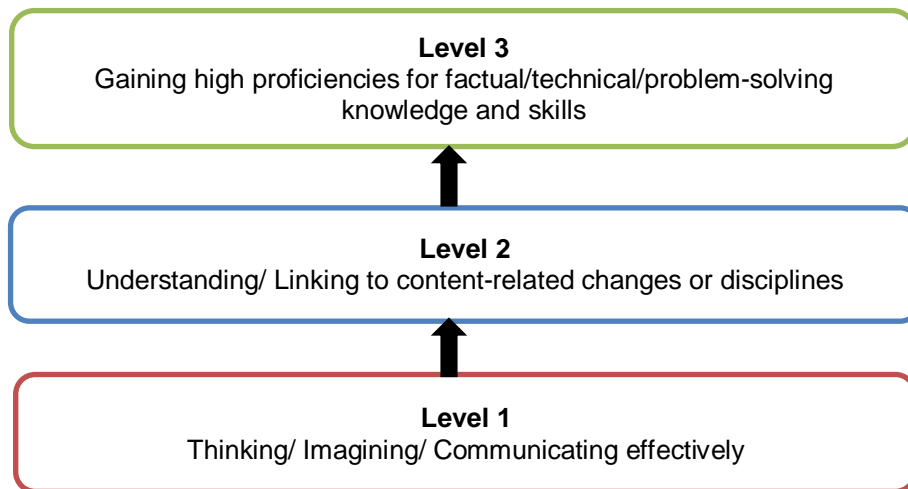


Figure 2.7 Levels of students' learning

At Level 1, if students who can perceive the knowledge that they can employ it in the real world or situation; that is, they understand and are able to interpret that knowledge, they tend to have their knowledge increased. Then, at Levels 2 and 3 which involves higher understanding, disciplines, and high proficiencies of knowledge and skills, some concerns are drawn that without connecting knowledge that is taught to students to the real world or contexts,

learning is not probably effective or successful. In other words, they are able to pass the tests, but with misconceptions, a lack of knowledge for problem solving, and a short-time period of knowledge retention and reduced understanding. These ideas also relate to the idea of situated knowledge which refers to knowledge or things that are perceived in relation to a particular situation or environment. In other words, situatedness of learning connects the whole environment (time and place/situation) to what is learned (Reffat & Gero, 1999) as shown in Figure 2.8.

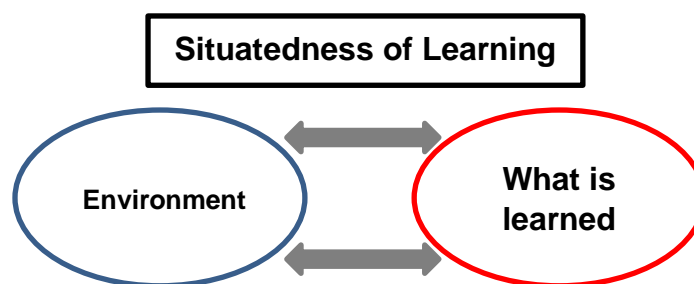


Figure 2.8 Situatedness of learning

As can be seen, deep learning and understanding process is an important stage to gain concepts or higher-level thinking skills. As time passes by, those concepts and previous-learnt content knowledge are supposed to retain in order to transfer for future use in out-of-class contexts. Hence, prior to teaching for retention and transfer, teaching for understanding is required for learners to store concepts into their retention interval. The similarities of both types of teaching (for understanding and retention) are that, for example, they require an organised format of presentation to assist learners in concepts (e.g. mind mapping, concept maps (Marton & Booth, 1997), or effective presentation promoting thinking skills). They connect what is learned with previous experience or knowledge, they both require deep learning or understanding in order to gain concepts and make learning meaningful, and both teaching types engage students in active learning (Cortright et al., 2003; Halpern & Hakel, 2003; McTighe & Seig, 2014; Zirbel, 2006). However, after acquiring knowledge, forgetting, as previously discussed, might occur, so the difference of teaching for retention, according to Halpern and Hakel (2003), is to promote

long-term retention, and learners are required to “generate responses, with minimal cues, repeatedly over time with varied application” (p. 38). In other words, content knowledge that they learned or understood should be repeated because practice to retrieve knowledge is necessary as it assists learners to recall the content and concepts that are learnt. To apply this principle, tests could be given to students at regular intervals, that is, there might be as many as four tests in a month. For example, the first test could be taken one day after learning content; then a couple of days later the second test might be distributed; after that the third and fourth tests are given at the second and last week of the month, respectively, with the interval increasing between tests.

Regarding learning facts and a foreign language at the beginning level at school, McTighe and Seig (2014) and Lublin (2003) stated that a surface learning approach, such as a rote or repeating method and memorising specific facts, are likely to be useful and unavoidable. However, deep learning still plays a greater role in promoting students' outcomes than surface learning, especially in the level of higher education (Chin & Brown, 2000). Moreover, deep learning or understanding is a more suitable approach that would benefit learners for the real-life contexts; in a way that, it encourages learners to think critically, evaluate, apply knowledge or concepts effectively into actual situations, and continue to retain that learnt content, perhaps for their future career, in the long run. Therefore, factors are necessary to be considered, such as curriculum design, learning objectives and outcomes related to expected levels of understanding that learners are required to reach, design in teaching methods or active learning activities (stimulating learners to think by connecting new knowledge to their past experience) for understanding, as well as actual practice leading to retention and transfer (Fenwick, Humphrey, Quinn, & Endicott, 2014). With respect to learners exposed to a deep learning setting, they should prepare themselves by organising the content knowledge structure, encouraging themselves to get involved in their study and put a lot of attempts on it, developing intrinsic motivation towards the subject, thinking in a critical way, initiating thoughts or ideas on new content linking with different

sources or experiences, and reflecting or evaluating the study or work from their own understanding.

In this section, paradigms and theories about knowledge retention were explained and discussed in terms of its importance, processes, and its relations to meaningful learning and deep approaches, which can lead learners to positive results of understanding, retention, and retrieval of what is learned. In the next section, the discussion of vocabulary learning in the EFL learning setting will be addressed, including its connections to knowledge retention.

2.3 Importance of vocabulary learning for language learners

Learning English language as a second language (ESL) or foreign language (EFL) is probably challenging for a range of language learners. Moreover, vocabulary is the major component or the heart of learning another language for them (Coady & Huckin, 1997). Consequently, without the vocabulary knowledge, learning a foreign language is hindered (Nation, 2013; Yang & Dai, 2011). In addition, vocabulary knowledge is interrelated to their language use; that is, the knowledge is likely to support their language input and output (Nation, 2001). Similarly, vocabulary learning is necessary as it is the foundation of all language skills (listening, speaking, reading and writing) (Barcroft, 2004; Hógain, 2012; Nation, 2001; Shabani, Parseh, & Gerdabi, 2014). As an EFL learner, there are underlying reasons for the importance of vocabulary learning in language acquisition and all skills. Firstly, vocabulary plays a crucial role in communication or in productive skills, i.e. speaking and writing. For example, in conversations, it is more important to be able to convey meaning or what one would like to say in contexts, so without grammar, one is still likely to communicate ideas or feelings by using vocabulary as it is the key to language (Lewis, 1993; Wilkins, 1972). In receptive skills, for English as a second or foreign language learners, the lack of sufficient vocabulary knowledge can cause them difficulties in reading texts in the target language (Huckin, Haynes, & Coady, 1993). Furthermore, in the listening skill, this can also lead to obstacles in communicative functions (Alqahtani, 2015). Some evidence also supported the importance of vocabulary as a component in

language learning. For instance, there are important correlations between vocabulary knowledge and learners' reading ability (Albrechtsen, Haastrup, & Henriksen, 2008; Laufer, 1992). Vocabulary acquisition as a way linking a word to its meanings is correlated with students' language skill performance and their success in language learning (Alderson, 2005; Laufer & Goldstein, 2004). Hence, apparently, with respect to the learners' language or communicative skills, vocabulary knowledge plays an important part in learning and acquiring the language (Schmitt, 2000).

Regarding language skills, vocabulary size is also an important function in order for language users to use it effectively. To the non-native language users, the estimates of vocabulary size are suggested that, for conversations (listening and speaking), approximate 2,000-3,000 word families are required (Schmitt, 2010), and for reading and writing, higher vocabulary size is likely required at 8,000-9,000 word families (Nation, 2006). As second language learners, it might not be necessary for them to achieve native-like language requirement, but an important thing is to consider individual goals and to be able to perform appropriate communicative skills in the target language (Schmitt, 2010). However, they are still required to be able to learn and increase their vocabulary knowledge as much as possible to benefit their higher education and future career. Hence, it is very important for them to retain their vocabulary and be able to retrieve the knowledge whenever they would like to use their language skills through tasks, activities, and in authentic situations. Then, in the next section, we will examine the vocabulary learning in several EFL contexts to overview EFL learners' background and problems in vocabulary learning.

2.3.1 Vocabulary learning in the contexts of English as a foreign language

As the importance of vocabulary knowledge in language learning for EFL learners was previously stated, we now explore vocabulary learning in the EFL contexts in Thailand and other countries as well. In the English language classrooms in Thailand, English is learnt as a foreign language and it is a

mandated subject from primary to tertiary education. Vocabulary tends to be a major obstacle towards Thai students' learning English and it poses a problem for teaching as well (Liangpanit, 2015). An interview conducted as a part of a study to investigate students' attitudes towards learner autonomy and classroom and out-of-class activities revealed that students viewed lack of vocabulary knowledge as their major problem in learning the English language (Saengsawang, 2012). Likewise, in China, a study revealed that students indicated that vocabulary was the main problem in learning English. Furthermore, students encountered some difficulties in memorising a number of words, and because of the lack of vocabulary, they found it rather difficult with reading materials (Yang & Dai, 2011). The researchers (ibid.) also added that, regarding the EFL contexts in China, the students depend on rote memorisation as a means in their vocabulary learning, with limited learning strategies towards vocabulary tasks. This is also congruent with learning English in the Saudi Arabian contexts where memorisation and teacher dependency play an important role in acquiring knowledge; as a consequence, this probably causes some difficulties in developing concepts and understanding, especially for deep learning (Alqahtani, 2015). Hence, as can be seen, vocabulary knowledge is likely to be crucial for English language learning in most countries where English is learnt as a second or foreign language. More importantly, not only is learning and increasing learners' own vocabulary necessary for their language skills, but retaining their vocabulary knowledge is also vital because they can make use of it by recalling or retrieving it from their memory towards performing those skills.

However, retention of vocabulary tends to be problematic for EFL learners. Bualuang et al. (2012) indicated that lack of vocabulary knowledge retention is a major problem for Thai students in learning English as it causes them to gain insufficient "language skill development and learning ability both at present and in the future" (p.93) and poor results in their national entrance examination. Additionally, Fors (2016) shared his teaching experience in EFL education in the United States with diverse students who studied English as a

second/foreign language at school. He found that when students had to communicate after high school in a basic English conversation, they did not tend to retain their vocabulary knowledge, which might be due to lack of using appropriate instructional methods. In regard to the EFL contexts in Iran, Ghorbani (2011) stated that due to some limitations in Iranian EFL classrooms, such as restricted time in a week, plenty of content to learn, and opportunity to use the language outside the classroom, students are likely to have a problem to retain their knowledge, which was indicated “it is here today, gone tomorrow” (p.1222). Additionally, this was consistent with some comments on learners’ knowledge retention rate falling down after the exam period (Bahrack & Hall, 1991; Higbee, 1977), and this possibly causes some difficulties in their current learning and future language use. In addition, Shafaei and Rahim (2015) revealed that with the teaching approaches of highly focused on content and rote-learning or a repeating method, students were dependent on the teacher’s translation into their mother tongue without much involvement in learning. This led to a problem of low vocabulary retention and development which has been encountered by EFL teachers in Iran, and is probably caused by limited interaction of learners with the English language materials (Shabani et al., 2014). In Vietnamese higher educational institutions, Harman and Bich (2010) [cited in Dat (2016)] stated that the teaching based on a lecture method can cause learning or knowledge retention problems which bring about a reduction in students’ engagement and enthusiasm, being more dependent on teacher, applying surface learning by memorising rather than understanding, and being unable to apply more complex thinking skills.

Based on my personal perspective and teaching experience at a Thai university, many students often forget the acquired or taught information. For example, when they are asked about how to use a grammar point or vocabulary which was taught previously, even during the previous semester, they were reluctant or unable to provide feedback. It was also seemingly difficult for them to recall or retrieve the content knowledge they had learnt. Therefore, their low content retention can cause the teacher to repeat the

forgotten language content, which can be time-consuming and reduce the time to learn further content, and their learning achievement and exam results are possibly affected (Freemana et al., 2014). Using teaching aids or surface efforts for vocabulary learning is unlikely to be productive as it increases the risk that learners will struggle to recall vocabulary knowledge (Nemati, 2009).

2.3.2 Acquisition and retention of vocabulary knowledge

Having stated the importance of vocabulary learning in the previous section, now we will turn to the principles of vocabulary acquisition and knowledge retention. First of all, regarding vocabulary knowledge, it can be generally categorised into two types of knowledge: receptive and productive. Receptive vocabulary knowledge refers to what learners need to know to comprehend with what they read or listen, while the productive one was generally defined as word knowledge that they need to use with speaking and writing skills. Although both may be varied in terms of vocabulary size and control of vocabulary, in order for effective vocabulary learning they still require to be taught in depth (Crow, 1986).

2.3.2.1 Vocabulary knowledge acquisition

First of all, to gain vocabulary knowledge, it is probably a good idea to explore how words are learned or associated with memory systems. According to Thornbury (2002), a word is basically learnt by its form and meaning, which is, in fact, associated with some other knowledge, such as sound, grammar, connotations, cultural additions, and other details. Therefore, when word knowledge is stored in the memory, it is organised mentally as a list or interconnections as shown in Figure 2.9.

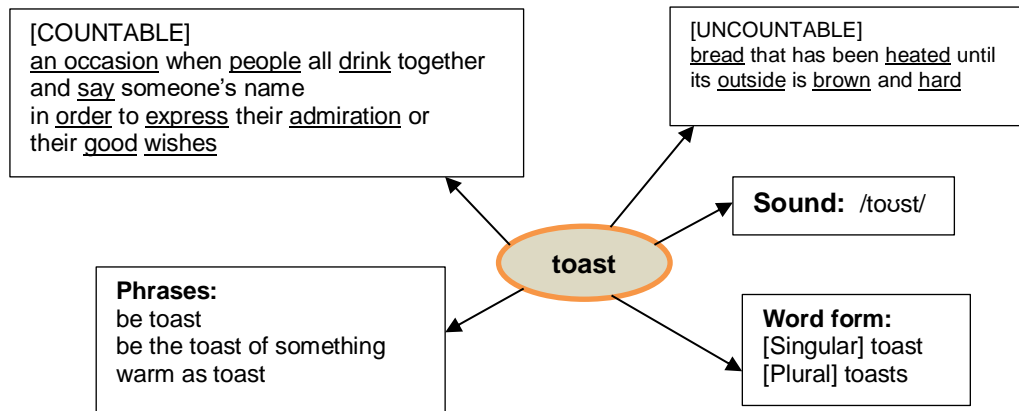


Figure 2.9 How a word is organised in the mind

Figure 2.9 shows how word knowledge is thought to be organised in the memory, resembling a network or a web structure, like a map. In learning new vocabulary in a second language, mapping a word into concepts or categorising can construct a conceptual and associated network. Hence, for better vocabulary acquisition, learners may not depend only on meaning or the surface aspect. On the contrary, associated with deep learning mentioned earlier that it is likely to assimilate through content to create concepts or understanding which probably lead to meaningful learning positively affecting students' knowledge retention, vocabulary knowledge can also be assimilated or taught in depth. According to Schmitt (2010), to gain deep vocabulary learning, vocabulary is probably conceptualised by, from his suggestions, 'developmental' and 'component' approaches. The developmental approach, on the one hand, is to assist learners, who may lack knowledge from the start, to master vocabulary learning through stages, from word unfamiliarity to accuracy of using words appropriately and grammatically. On the other hand, the component approach focuses separating vocabulary into several particular patterns, mainly related to forms, meaning, and use.

Based on the developmental approach, learners' vocabulary knowledge was evaluated by using "vocabulary knowledge scale" which are varied into two types of scales, a five-stage one (Paribakht & Wesche, 1997) and a four-stage

one (Schmitt & Zimmerman, 2002). These scales are presented in Figures 2.10 and 2.11.

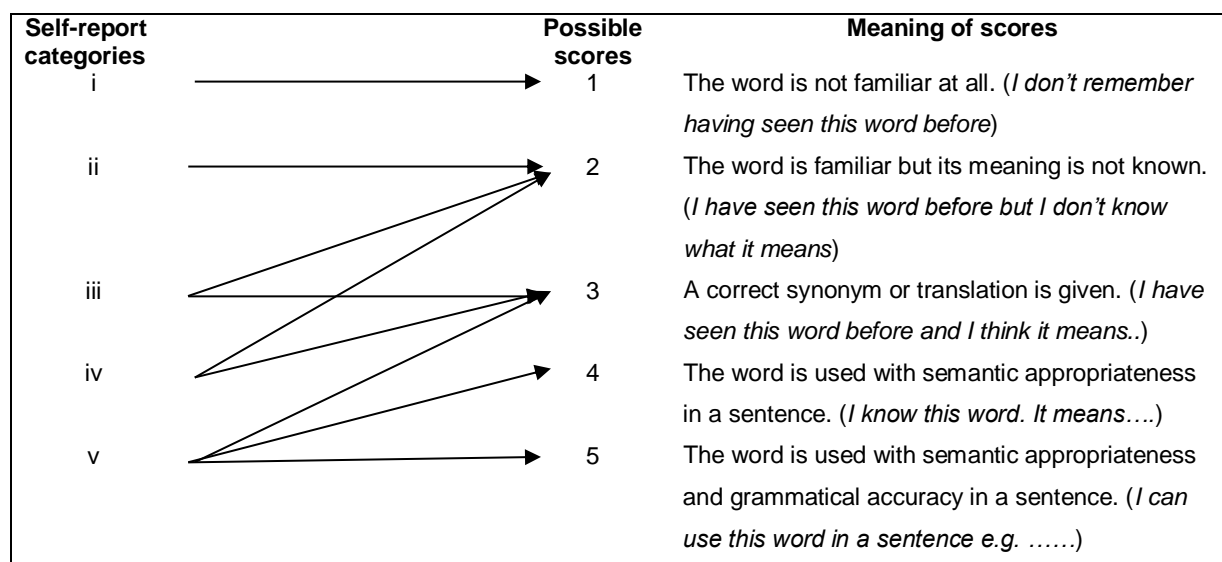


Figure 2.10 Vocabulary knowledge scale (Paribakht & Wesche, 1997)

Stages	Assessment
A	The word is not known at all. (<i>I don't know the word</i>)
B	The word is seen before, but its meaning is uncertain or not known. (<i>I have heard or seen the word before, but am not sure of the meaning</i>)
C	The word is known when being perceived in a sentence, but the use of word is not known in either receptive or productive skills. (<i>I understood the word when I hear or see it in a sentence, but I don't know how to use it in my own speaking or writing</i>)
D	The word is known and can be used in both receptive and productive skills. (<i>I know this word and can use it in my own speaking and writing/ reading and listening</i>)

Figure 2.11 A four-stage developmental vocabulary knowledge scale (Schmitt & Zimmerman, 2002)

The suggested assessment on developmental vocabulary knowledge scales may generally be simple for learners to evaluate their word knowledge. However, there are some limitations which users need to take them into consideration when employing these scales (Schmitt, 2010). That is, the level of description from both figures does not probably provide sufficiently detailed interpretations, is not in sequential stages, and it may not be used for indicating

the progress of vocabulary knowledge as the stage five seems difficult to be differentiated from those in categories/stages 3 and 4 (Figure 2.10). Consequently, from both scales, all categories or stages and particularly the stage of semantic appropriateness or using a word in a sentence correctly may not truly reflect their vocabulary knowledge, and unable to rate a number of words within a limited period of time. Hence, with similar level of descriptions and concepts, the multi-state model developed by Meara (1996) was used to describe vocabulary acquisition in a second language.

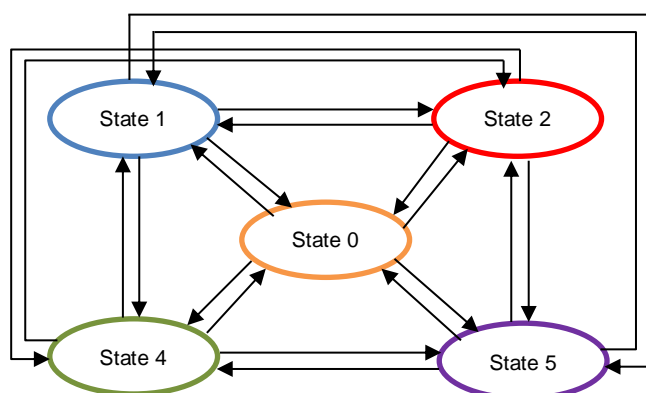


Figure 2.12 A multistate model of vocabulary acquisition (Meara, 1996)

From Figure 2.12, regarding the probability of vocabulary acquisition and knowledge retention, the multi-state models share a similarity of five states, and seem to be practically related to what occurs with students' word acquisition and retention which can proceed from one state to any other without sequence. The movement of vocabulary acquisition and knowledge starts from 'unknown words' or State 0 to State 5 (acquiring a word and using it correctly). Basically, regardless of vocabulary progress, the states of acquiring words are possible to move freely between the states – from high or intermediate states to State 0, and from State 0 or 1 to higher states. This is because during the vocabulary learning, due to the changeable learning conditions and environment towards learners' knowledge acquisition and memory, they probably reach State 5, or they know the word and can tell its meaning (State 2 or 4). Later they might forget the word they learnt, which brings them to State 0 again. Therefore, it can be seen that these models of

multi-state vocabulary acquisition may be suitable to measure students' word knowledge more extensively within a specified timeframe and to be able to predict the development of their vocabulary in the long run (Meara, 1996). Hence, after learning how students probably acquire their vocabulary knowledge, we can see that aspects of the models tend to be changeable or moveable between each other. In order to support their word learning, we may explore some types of learning which possibly increase their opportunities towards deep and more effective vocabulary learning as it does not focus on memorisation, but understanding word use and to long-term memory, which is effective for knowledge retention and transfer for future use.

2.3.2.2 Incidental and deliberate learning

In language learning, incidental and deliberate types of learning are likely to occur in the process (Nation, 2014). Incidental learning is defined as an unintentional learning experienced through activities, tasks or other situations, without planning (Kerka, 2000). On the contrary, deliberate learning pertains to intentional or planned learning situations where learners gain knowledge consciously or intentionally. Regarding incidental learning to vocabulary knowledge, learners gain the knowledge through communications or messages, not focusing on word form or structures as in deliberate learning which should be under students' self-responsibility, incorporated with the teacher's guidance (Nation, 2003). These terms are also relevant to those described by Oxford (1990) that "contextualised" learning, which is similar to incidental or unintentional learning, enhances students' ability to learn, e.g. vocabulary, through contexts. A study on assisting students to learn vocabulary systematically and continuously, incorporating cooperative approaches and technology e.g. web-based assessment, online journal, and a word-list software into the English course (Mehring, 2005), also assured that learning vocabulary through context brought learners more opportunities to use it, and assisted them to retain the better vocabulary knowledge. Furthermore, a "de-contextualised" learning approach, similarly defined as *deliberate* learning, supports vocabulary learning in an intentional way with memorisation

strategies, for instance, students are provided the de-contextualised vocabulary teaching by, such as a word-list method, word cards, or using dictionaries (Nation, 2014). This is also confirmed by a study by Elgort (2011) that the deliberate vocabulary approach, experimenting with participants' pseudowords acquisition, and employing form priming¹, masked repetition priming, and semantic priming was found to be positive or efficient towards vocabulary learning and acquisition, including the learning rate and accuracy. However, in EFL classrooms, textbooks usually play an important part in the English course as the main source and pedagogical tools for teachers (Littlejohn, 2011; McDonough & Shaw, 1993; Nunan, 1991). This is because most textbooks seem to have limited word knowledge, which considerably focus on form and meaning of words rather than contextual use (Brown, 2010). It is, therefore, important for teachers to create a balance between deliberate and incidental vocabulary learning when using textbooks for course instruction (Nation, 2003). Moreover, it is suggested to expose the beginners to the deliberate or de-contextualised instruction, and later gradually provide them with context-based vocabulary activities, such as listening to stories, authentic conversations, or extensive reading (Hulstijn, 2001; Nemat, 2009).

Frequently, previously-learnt vocabulary knowledge might be lost due to forgetting or other factors, such as the intervention of new knowledge or events, during the retention process. There are, therefore, some strategies that might assist learners in retaining knowledge longer, such as elaborating on information, relating unfamiliar information with something they know, and putting information in order to remember it (Nuthall, 2000). Additionally, Ghorbani (2011) and Rahn and Moraga (2007) indicated that for better knowledge retention, more profound learning and strategies are probably the key to language development. To conclude, retention of knowledge plays a very important role in education, especially in the language learning context. For example, when taking additional English language courses, learners may

¹ Priming refers to the unconscious response of one stimulus to another one.

have to use their existing language knowledge or vocabulary they learnt in the previous courses. In regard to EFL learners, vocabulary knowledge is the key to success to apply or take part in other language skills. Appropriate teaching approaches and strategies are likely to be a solution which is required to be designed in order to suit students' characteristics and needs. Hence, various or more than one methods are probably employed in the classroom setting.

2.3.3 Teaching for vocabulary knowledge retention

As mentioned in the previous section, contextualised vocabulary learning can be effective for deep learning to increase word retention. Therefore, learners can gain vocabulary acquisition in depth through different ways. For example, they can increase vocabulary learning through oral skills (listening and speaking), by listening to stories they are interested in, a passage while reading, and tests or quizzes (Nation, 2001). Furthermore, reading comprehension is likely to enable students to develop their vocabulary knowledge through reading tasks or texts (Chall, 1987; Nation, 2001; Stahl, 1990). Hence, vocabulary learning in depth plays a significant role on students' retention of knowledge, we now turn to explore principles and approaches in teaching to promote and retain their vocabulary knowledge. According to Thornbury (2002), some vocabulary teaching approaches are relevant to memorising and deep learning principles, and are summarised in the following table.

Table 2.3 Vocabulary learning approaches related to memorising (Thornbury, 2002)

Methods	Descriptions	Suggested activities
1. Repetition	This kind of repetition is used to memorise a new word which is firstly encountered. Repeating 'at least seven times over spaced intervals' (p.24) gives positive results in remembering.	Reading
2. Retrieval	It seems to be another kind of repetition which students are likely to use to practice by frequently using words that are learnt, so that they can recall them later.	Word use in written sentences or conversations

Methods	Descriptions	Suggested activities
3. Spacing	Teaching and practice are probably distributed into intervals. After learning a set of words, it is a good idea to test or review them across a period of time, before and after presenting a new one.	Word tests Review
4. Pacing	Learners are provided opportunities to review vocabulary at their own pace, by organising their own rehearsal or individual review activities.	Individual rehearsal/ review
5. Mnemonics	They are techniques to help students store and retrieve words knowledge better, e.g. spelling or meaning. The visual technique seems to be effective in such case.	Key word technique

Table 2.3 suggests vocabulary learning approaches that are relevant to memorising. Basically, when encountering new words, some memorising approaches are probably used to store them into the memory systems. Instead of “rote learning,” other kinds of repetition can be conducted to store vocabulary content, such as a spaced-interval repetition method, retrieval practice, and memory techniques. However, without learning in depth, those words might be forgotten quickly. Hence, to bring them into the “never forgotten” state — storing in the long-term memory and being able to retrieve them for the future use, several approaches for deep vocabulary learning are suggested in Table 2.4.

Table 2.4 Deep vocabulary learning approaches (Thornbury, 2002)

Methods	Descriptions	Suggested task(s)
1. Use	To better store vocabulary knowledge into long-term memory, manipulating words to use is likely recommended. The more frequent learners use words, the less they might forget them.	Decision-making tasks (identifying, matching, sequencing, sorting) Games
2. Cognitive depth	The more cognitively demanding word knowledge is, the deeper vocabulary learning occurs. For example, learners rather take the points of word functions into consideration than simply matching the word with meanings or rhymes.	Decision-making tasks Sentence completion
3. Personal organising	Learners personalise their way of vocabulary learning, such as writing sentences which contain words they learnt and read them out loud.	Making up one’s own sentences

Methods	Descriptions	Suggested task(s)
4. Imaging	Relating a new word with a mental picture, especially the self-generated one, is likely to give a positive result on long-term memory.	Visualising a picture of a new word
5. Affective depth	Similarly to cognitive depth, words are probably memorable, by asking questions about a new word that is learnt or relating it to some emotional points of an individual.	Word discussion Setting up questions related to a new word

Table 2.4 suggests deeper vocabulary learning approaches that possibly enhance students' vocabulary knowledge retention. As can be seen, to make vocabulary learning meaningful and effective to recall or retrieve, learners may have to relate new words they learnt to their cognition. According to the table, if they are exposed to frequent use of words, considering word forms, a visualising method, and relating a new word to their emotional states, new words are more likely to be stored into their long-term memory, better recalled or retrieved (Thornbury, 2002). In other words, the way learners organise their learning or process information qualitatively could yield positive retention of knowledge (Craik & Tulving, 1975). Furthermore, Yang and Dai (2011) suggested some methods to teachers which are likely to provide stable and systematic vocabulary learning and retention for students, and may be relevant to and appropriate for the characteristics of Thai students in the EFL context as well. These suggestions are selectively explained as follows:

- 1) Encourage students to create lists of vocabulary or new words they have learned from class, tasks or activities, especially words which are problematic for them or they are interested in.
- 2) Organise a regular schedule for word or vocabulary recalls in order to avoid forgetting and increase more retention, including supporting more out-of-class activities to expose them to the use of vocabulary.
- 3) Students should be able to apply the word form to expand their range of more words by organising their vocabulary classifications such as part of speech, synonyms, antonyms, or style, for their future lexical augmentation.

Having discussed the importance and process of vocabulary knowledge retention and efficient vocabulary teaching approaches, it might be important to consider some other aspects in language learning of individual learners, such

as characteristics, gender, or different academic majors. The next section will examine the existing differences in language learning regarding EFL learners.

2.4 Differences in language learning

In terms of cognition, there are some differences between men and women. They perform activities and may think in different ways at the surface and deep levels (Eddy, 2012). For example, one study found that female students exhibited a higher level of performance than males in verbal tests and men could perform visual–spatial tasks better (Weiss, Kemmler, Deisenhammer, Fleischhacker, & Delazer, 2003). Other studies revealed that men tended to outperform on mathematics and social studies, while women performed better in reading comprehension, recognition and memory tasks, including perceptual ability (Hedges & Nowell, 1995; Lové, 2013; Viriya & Sapsirin, 2014; Voyer, Postma, & Imperato-Mcginley, 2007). Women tend to have stronger memory retention and are more adept at recalling from long-term memory than men (Goldman, 2017).

2.4.1 Gender differences in language learning contexts

Regarding language learning, several factors are involved in order to achieve or to be successful, and achieved outcomes and competence vary among learners. In many studies, learners' factors that influence language learning have been investigated for many years, and they underlie the differences in achievement, such as learners' cognitions, learning styles, motivation, personality, previous knowledge and experience, and gender (Ellis, 2004). Previous studies found that gender was one of the major factors that relates to differences in language learning strategy use, academic achievement and cognitive styles, and suggests that male and female language learners outperformed each other in different ways (Božinovic & Sindik, 2011; Oxford, 1993; Zoghi, Kazemi, & Kalani, 2013). Moreover, gender and social class influenced the choice of students' use of language structure, that is, it was likely that girls used different word patterns from boys, and gender is probably a significant dimension in language learning (Mitchell et al., 2013).

Many studies on EFL or L2 learning contexts in other countries revealed that female language learners were found to be more prominent in some aspects. Slik, Hout, and Schepens (2015) indicated that female adult learners, who learned Dutch as a second language, had a higher proficiency in writing and speaking than their male counterpart. However, regardless of gender, there might be other factors, such as the level of education, age, or length of the language study. Likewise, Gu (2002) found that female EFL learners, in the Chinese context, exhibited more frequent use of vocabulary learning strategies which were correlated with their language learning achievement. Kaushanskaya, Marian, and Yoo (2011) also revealed gender differences in word learning and retrieval, that is, female adult learners outperformed men in familiar word memory tasks, possibly due to their distinct mechanism of short-term and long-term memory system. This aligns with another study (Lin, 2011) investigating L2 learners on vocabulary retention through video-based computer-assisted language learning (CALL), which found that female learners outperformed male students in both vocabulary immediately after instruction and retention test scores on easy video text, while male tended to perform better in comprehension of difficult video content. Therefore, the researcher (ibid.) suggested that the level of text or content difficulty has to be taken into consideration to foster the learners' comprehension and vocabulary learning. Previous work also found the relationship between the use of different language learning strategies and gender, including language proficiency. A study in the Korean EFL context (Ok, 2003) revealed that female students tended to apply greater language learning strategies than male students. This is also consistent with other work (Salahshour, Sharifi, & Salahshour, 2012; Yilmaz, 2010) in Turkey and Iran, which revealed that gender difference existed in students' selection of strategy. In addition to gender differences in the strategy use, these studies found that there was a relationship between language proficiency and the use of a language learning strategy, that is, students with increasing language proficiency tended to use more certain strategies to achieve their learning.

Meanwhile, other previous studies revealed no significant differences between male and female students regarding their English language learning. Grace (2000) found no significant difference in vocabulary retention between male and female French learners who engaged in a multimedia CALL lesson which assisted their language learning with translation features into their mother language (L1). The researcher (*ibid.*) indicated that it was probably due to their level of language proficiency and equal benefits they gained from the CALL lessons. Some related studies, in Thai contexts, also found no significant difference in gender in EFL classrooms. One study (Phonhan, 2016), on variation in language learning strategies between male and female university students, high and low language proficiency students and between different majors, revealed that there was no significant difference with the use of language learning strategies in terms of language proficiency, gender and academic majors. This researcher (*ibid.*), however, indicated the possible factors that might affect the variation in using the strategies, such as male and female different capability in language learning, and characteristics of students' academic majors. Another study conducted to investigate the motivation in English language learning between male and female students from science and technology background (Dhakal, 2018) revealed no significant gender differences in their motivational orientation. However, it was found that both genders had a very high level of motivation in language learning for the purposes of communication, academic study and future career, and female students tended to have a slightly higher level of motivation than males. Viriya and Sapsirin (2014) also shared the similar results regarding the strategies, that is, gender had no significant effect on language strategy use, but it revealed significant gender difference on students' learning styles, that is, female students were likely to be in favour of learning through speaking and listening (auditory learning style) and group learning styles rather than individual learning. The researcher (*ibid.*) believed that, apart from the aspect of gender, the causal inferences of variation in students' learning may be

influenced by their particular cultural background in various contexts and each individual's different characteristics.

In terms of perceptions, a study in the Japanese context indicated that attitudes towards English learning could be affected by gender differences, that is, female students tended to have positive attitudes towards English learning and to be different in making choices of their academics or careers, which might be caused by social and educational elements (Kobayashi, 2002). Moreover, Yilmaz (2010) revealed in his study that, overall, both genders seemed to be reluctant to use affective strategies which are concerned with their emotions, motivation and attitudes towards their study. However, when the strategies were used, such as being active and participatory in class activities and having positive attitudes towards the course, female students tended to use them more frequently than males. Furthermore, the researcher stated that the participants “did not encourage themselves to store and retrieve information when they had to cope with a demanding task throughout their ELT education” (ibid. p.686). Liu (2007) revealed that English language proficiency correlated with motivation and attitude in language learning. When the motivation and attitude increased, students tended to achieve higher language proficiency. There was, consequently, a positive and significant correlation between English language proficiency and academic success – in other words, students with high proficiency could perform better on academic achievement than those at lower levels (Maleki & Zangani, 2007). Hence, differences in gender learning characteristics and capabilities could cause variation in language learning and language use, such as applying affective strategies in the classroom, intrinsic and extrinsic motivation which lead to different levels of language proficiency that may bring about different knowledge retention and learning outcomes.

2.4.2 Differences in academic majors

Apart from gender differences, some prior studies indicated differences and relationships between academic majors, such as learning styles or academic performance (Buckley, 2007; Cano, 1999; Tomruk, Yeşilyaprak, Karadibak, & Savcı, 2018). In this research, there were two academic majors enrolled in the

English course and participated in the experiment: engineering and architecture students. The engineering major mainly involves science and mathematics subjects, while the architecture program engages art and the science of designing. With these two different majors, variation or similarities in some aspects probably exists. Engineering students seem to be active learner and prefer a 'hands-on' approach (Driscoll & Garcia, 2000; Ictenbas & Eryilmaz, 2011). Supported by previous research on cognitive styles of engineering students from several departments, Tulsi, Poonia, and Anu (2016) revealed that the majority of them shared similar preferences that they are active (enthusiastic to do activities, discussion, or applying knowledge), sensing (discovering facts, problem-solving, or doing hands-on work), visual (learning from pictures, flow charts, movies or demonstrations), and sequential (information presented in linear steps or connections). The study also indicated that, based on the students' opinion, they were in favour of the subjects which emphasised more on practicalities and authenticity that are applicable in the real contexts. In terms of using vocabulary strategy, Afshar, Moazam, and Arbabi (2014) revealed, from their research, that engineering students tended to use different vocabulary strategies from humanities students, that is, their strategies were more sophisticated or "...deeper and more thought-provoking in nature" (p.55). For example, the engineering students used monolingual English dictionaries and the strategy of word associations (collocations or matching).

Perhaps unsurprisingly, architecture students were found to be active and to have abilities in visual representation and the relation to dimensions of objects (Mostafa & Mostafa, 2010). They were also claimed to be "intuitive feelers and intuitive thinkers" (Brow, Hallett, & Stoltz, 1994, p. 151) which means they seem to learn effectively through problem-based activities, and group work. A study investigating architecture students' learning approaches and performance in Turkey indicated that they tended to strongly rely on the sequential subject matter through principles, concepts and methods, which might occur in the traditional instruction (Demirkan & Demirbas, 2010).

Additionally, they seemed to be assimilating, converging, and diverging learners who learned through explanations, ideas and concepts, tried to find practical uses for ideas and theories, and liked to gather information from different perspectives and work in groups (Demirbas & Demirkan, 2003; Demirbas & Demirkan, 2007; Kvan & Yunyan, 2005). Therefore, achievement in language learning might be affected by different characteristics of academic majors. Gu (2002) revealed that science major students gained more extensive vocabulary than those in arts major. However, after taking an English proficiency test, the arts students performed better on the language proficiency. Additionally, between these majors, it was found that the students had a different vocabulary learning strategies. Phonhan (2016) stated, based on his research, that students from different academic majors used different learning strategies, and students who majored in mathematics and science tended to use more metacognitive strategies, such as planning, monitoring and evaluation to accomplish tasks, which are often used in language learning, than those majoring in Thai language or social studies. As can be seen, with different academic majors, students probably employ different uses of learning strategies (Yilmaz, 2017). Apart from academic majors that might be an extraneous variable affecting students' academic achievement, Saengsawang (2013) added that time spent on class work, workloads in other courses, responsibility and willingness to participate in assigned tasks were important factors in their learning outcomes.

As differences in language learning discussed above, results indicated both significant and no significant difference between the two genders and academic majors. It can be seen that the difference exists, but it may vary in particular contexts or settings, based on academic proficiency, cultural and social backgrounds, and learners' characteristics. However, to promote students' vocabulary learning, technology integration in the teaching process may enhance their vocabulary knowledge acquisition (Jones, 2001; Souleyman, 2009). Incorporating multimedia, verbal and visual aids brought positive results in learning vocabulary, especially the visualization that plays an

important part in those results, and leads to depth of learning, understanding, and longer knowledge retention (Jones, 2001). Furthermore, with present web-based learning platforms, a number of resources are provided to increase the effectiveness of the classroom teaching and learning. In the next section, blended learning, the combination of technology and conventional teaching approaches, will be discussed to examine its possibilities and designs towards vocabulary learning and knowledge retention in EFL contexts.

2.5 Blended learning in education for the 21st century learners

The widespread use of Information and Communications Technology (ICT) can be seen in various fields, especially in the education. Attempting to enhance students' learning, and allowing them to achieve their goals in higher education with cost-effectiveness and flexibility, blended learning, which basically combines teaching methods from both face-to-face and online learning, is generally provided in colleges and universities (Cosgrove & Olitsky, 2015). Consequently, blended learning approaches may also provide EFL learners alternatives and opportunities to achieve satisfying vocabulary learning outcomes and word knowledge retention for future use. Blended learning is defined as a "formal education program" that is partially incorporated with face-to-face learning with teacher and online learning in which students' control can take part in some ways: learning pace, place, or time, that their own path can connect with the course to create blended learning experience (Horn & Staker, 2014; McKenzie et al., 2013; Tucker et al., 2017). Adapted from Köse (2010), Figure 2.13 illustrates the basic principle of blended learning which combines the instructional methods of traditional or face-to-face and technology mediation into the course. In the face-to-face method, classroom instruction occurs with personal interaction between teacher and students or between the peers through individual or group work and practice. Meanwhile, in technology-mediated instruction, students can learn the course content online beyond the classroom at their own pace and time through synchronous or asynchronous communication.

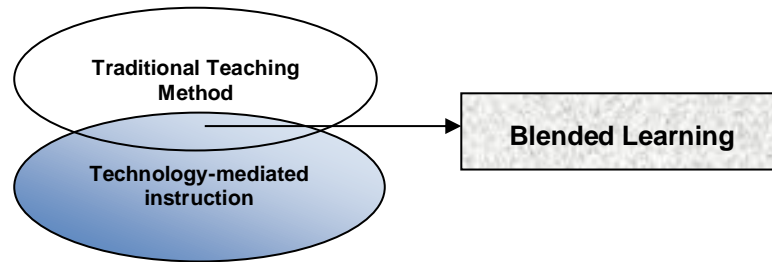


Figure 2.13 Basic principle of blended learning (Köse, 2010)

Moreover, blended learning comes in a wide range of implementation models. Figure 2.14 summarises the continuum of models used in schools, giving educators a working picture of many ways in which online learning blends with and supports traditional instruction (Blackboard, 2009). Models 1 and 2 represent blended learning programs which incorporate a large portion of online instruction, while Models 3, 4 and 5 illustrate blended learning that increases the potential of face-to-face instruction. Therefore, blended learning instruction can be organised and adjusted in accordance with the learners' characteristics and resources provided at school or the university.

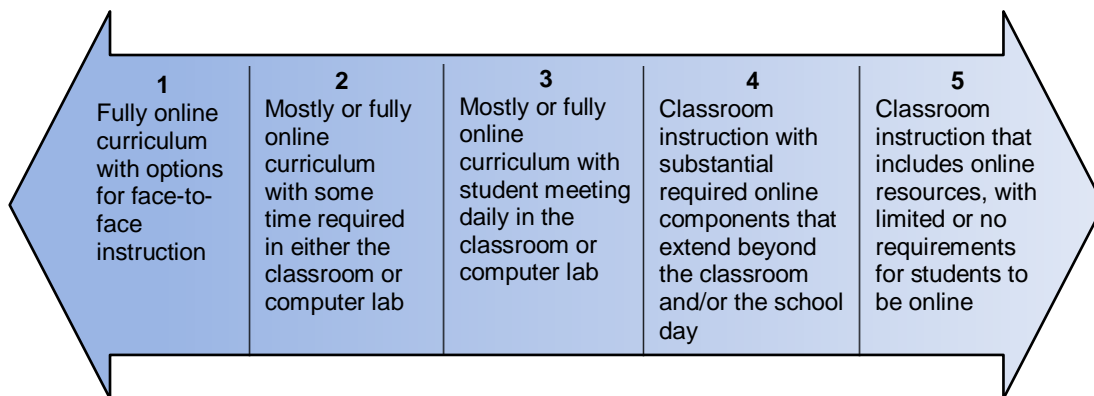


Figure 2.14 Continuum of blended learning models (Blackboard, 2009)

According to Blackboard (2009), who may have a vested interest, blended learning is a rapidly-growing instructional model that provides effective teaching aids which suit the needs of 21st century learners. It helps schools, or some schools with limited resources, promote academic achievement and learning skills, supports credit recovery programs, enhances the teacher's professional development and offers learning opportunities for active learners.

Additionally, Blackboard (2009) explained that it is implemented in a variety of ways, “ranging from models in which the curriculum is fully online with face-to-face interaction to models in which face-to-face classroom instruction is integrated with online components that extend learning beyond the classroom or school day” (p.1). In other words, blended learning utilises the flexibility of the combination between technology and classroom instruction, which benefits courses or training programs in terms of content delivery and assessment to lead to satisfactory learning outcomes and cost effectiveness (Banados, 2006).

The growth of blended learning has been fostered in many ways; for example, teachers’ roles have evolved as facilitators, instruction is applied to suit individual learners, students are provided increased flexibility and learning experiences, and learning management systems or software are used to support a wider range of instructional programs. Since the web-based technology has been increasingly and practically used, it is possible for learners to be engaged in the blended learning approach (Djiwandono, 2013). With its potential, it is easy to make learning tasks outside the classroom possible, and it may increase the effectiveness and efficiency of teaching and learning that is positive for learners’ motivation, memory, and retention to perform academically at their best level (Granito & Chernobilsky, 2012; Miller, 2009). Hence, the key components of the blended learning environment consist of the following (Bonk & Graham, 2005; Garrison & Vaughan, 2008; Tucker et al., 2017):

- It carefully integrates face-to-face and online approaches by reorganising proportions of class timetable appropriately;
- With online self-study tasks, students can personalise their own learning pace, especially outside the classroom, and make their own decisions to gain learning experience;
- Student engagement is very important to optimise both individual and collaborative learning for skills; and
- Collaborations to learn with peers and from experts should be created.

According to a study of applying blended learning in the classroom (Have, 2012), it was found that utilising digital media could enhance students' level of knowledge retention. The researcher recommended that educators utilise digital content that incorporates quality traditional teaching methods as discussions or explanations, which can create a suitable environment to support the students learning capabilities, increase their understanding and retain the content they have learned. Marsh (2012) stated that blending different learning approaches and strategies is utilised to maximise knowledge acquisition and skills development. To make learning successful, teaching incorporates more than one method, different strategies can be applied by students in their learning, and they should be offered a variety of different learning opportunities in their study program. Moreover, self-access content, such as printed matter, video, TV, and e-learning activities, has long been combined with traditional methods to supplement learning. Language teachers have also blended computer technology with face-to-face instruction for decades. Therefore, the practice of blended learning is not a new concept of teaching, but it has gained significant attention to combine different methods of learning, environments, and learning capabilities in order to make learning more abundant or optimal. Particularly, when the Internet arrived, it brought changes for language learners, such as authentic language resources and access to the worldwide community, especially with Web 2.0 technologies, which can be a powerful medium for language teaching. Computer technology and the Internet are utilised in blended learning courses to enhance students' learning. For example, word processing software, such as wikis or Google Docs, is used for collaborative writing, self-assessment, and peer assessment. Moreover, instant messaging can be used to practice conversation skills and create forums for discussion. Students use the Internet for research on class projects or use blogs for helping to develop their writing skill. With these tools, teachers and students are able to engage in the blended learning environment. In foreign language teaching, it is certain that the teacher is important and irreplaceable because students have an opportunity to consult or contact their

teacher (Hubackova et al., 2011). However, online methods are also able to provide various effective ways of learning and support traditional face-to-face learning environments, as mentioned above. Therefore, the researcher suggested that, firstly, teachers should be trained to be able to use the blended learning approaches effectively. Secondly, teachers should take students' autonomous learning skills into account, and encourage them to develop these skills and to have motivation to learn on their own. Hence, being effectively used and well-implemented, blended learning can be progressive and useful to offer a platform for teachers and students. Furthermore, blended learning is probably an effective instructional process for the EFL classroom in terms of enhancing the students' academic performance and knowledge retention.

2.5.1 Blended learning in EFL contexts

As the basic principles of blended learning towards education discussed above, we now examine the role of blended learning to support the EFL classroom. According to the advantages regarding each of the face-to-face and online approaches, it is probable that they provide the effectiveness to assist the foreign language learners in language acquisition.

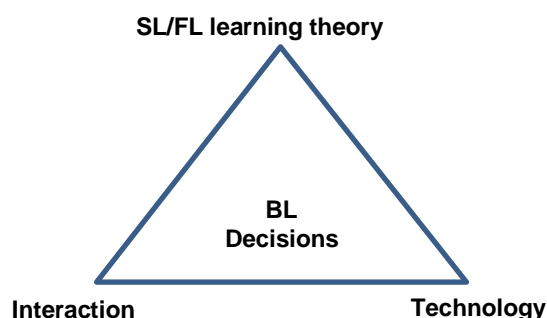


Figure 2.15 Triangle of evidence to inform decisions about blended learning (McCarthy, 2016)

To bring a clear picture of language acquisition in relation to blended learning, McCarthy (2016) suggested three potential components of evidence, as shown in Figure 2.15, which mainly influence the direction or decisions of blended learning. As can be seen, to head towards the appropriate blended learning direction, second or foreign language learning aspects (i.e. cognitive

learning approach, activities, or theories) are taken into account, in conjunction with interactions inside and outside the classroom and technology-integrated learning. Moreover, in making decisions regarding blended learning elements, some factors need to be considered, such as learners' preferences towards learning methods, interaction, and achievement (Banados, 2006). That is to say, it is probably advisable to explore the target learners' requirements of learning approaches – their preferences or ideas towards face-to-face and online learning environment, materials, activities, interaction with the teacher and their peers, and learning from feedback. Furthermore, in that type of learning environment, it is necessary for them to achieve two main learning goals; language learning (to communicate or use the language effectively and successfully) and technology mastery (engaging them in an interactive environment with peers and instructor, including self-study by offering them opportunities to learn at their own pace, especially outside the classroom).

To allow this inquiry to occur, incorporating technology, e.g. by using a learning management system, to manage the lessons is also influential and perceived as a positive tool for students in the English language course (Alaidarous & Madini, 2016). With the general elements of the learning management system, such as content/lesson delivery, assignment, assessment, journal, survey, discussion platform, and resources, the EFL course is possibly manageable (Krasnova & Sidorenko, 2013). For example, with the emphasis on practice through personal interaction and immediate feedback in the classroom, using technology inside the classroom may provide students an exciting and challenging learning atmosphere where they are able to work in a collaborative group and learn to improve from each other. Moreover, online components also offer learners opportunities outside the classroom or at their flexible time and learning pace. In other words, students are encouraged to be active through the learning process incorporating technology, both inside and outside the classroom, with guidance from teachers who support them as collaborators and facilitators (Banados, 2006). Additionally, with study time expanded for

before-class assignments, they tend to develop their autonomous learning skills (Wang, Chen, Tai, & Zhang, 2019).

2.5.2 Blended learning to enhance vocabulary learning and knowledge retention

As mentioned earlier how vocabulary learning plays a crucial role in the language acquisition, especially for second or foreign language learners, now we turn to the discussion of some frameworks of blended learning consisting of important components in a way that they will enhance learners' vocabulary knowledge retention.

2.5.2.1 Frameworks

In second/foreign language learning, there are some main components integrated into a blended learning model as shown in Figure 2.16.

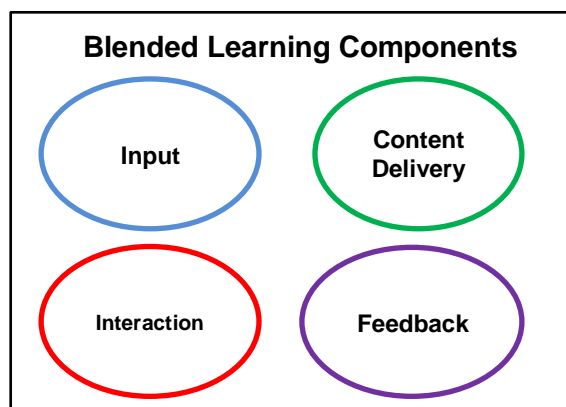


Figure 2.16 Basic & practical components in a blended learning course

Figure 2.16 presents a practical model used in a blended learning course (Banados, 2006). The model comprises four components: input, content delivery, interaction, and feedback. Firstly, the language input is necessary to consider which type of channels should be used (e.g. extensive reading, listening, or written test). Then, the content can be delivered by digital tools or equipment that are selected appropriately. While learning through tasks, interaction between learners is also an important part in order to engage them with peers, technology, and cognitive thinking (Chapelle, 2003; Ellis, 1999). Finally, effective corrective feedback, which mainly leads to improvement (Ellis, 2008), is the key component, such as clarification requests, elicitation, and

metalinguistic cues, especially to vocabulary or grammatical points (Ferreira, 2003). To create a deeper and more meaningful learning environment, a collaborative and interactive learning process benefits knowledge acquisition and understanding (Garrison & Archer, 2000). Furthermore, as student engagement through interaction or giving feedback is the key in blended learning, it is vital for them to be involved in inquiry (a process of learning/problem-solution). Hence, blended learning relates the instructional process to learners' collaboration and knowledge construction, which can lead to a successful educational experience.

2.5.3 Gender differences in a blended learning environment

As gender differences in language learning discussed earlier, in terms of students' perceptions towards blended learning courses, previous studies from various countries revealed no significant difference in their perceptions between male and female respondents who had positive views about the approach (Ekawati, Sugandi, & Kusumastuti, 2017; López-Pérez, Pérez-López, & Rodríguez-Ariza, 2011; Shantakumari & P, 2015; Sucaromana, 2013). In a blended learning course in Turkey, Naaj, Nachouki, and Ankit (2012) found that male students positively perceived and were more satisfied with the course than females, while females had more interaction in the face-to-face environment. Meanwhile, other studies revealed that female learners highly outscored their counterpart in positive attitudes towards technology-mediated elements used in the course (Al-Fadhli, 2008) and seemed to be in favour of social and academic out-of-class interaction during the blended learning course (Yoon & Lee, 2010). Although males perceived their computer self-efficacy at a higher level, females' belief of their capability in performing a computer task had more significant impacts on their enjoyment and satisfaction towards the blended learning environment (Dang, Zhang, Ravindran, & Osmonbekov, 2016). Furthermore, the factor of gender was indicated as the effect on sense of classroom community in terms of interaction and trust, which were rated higher in females, due to their feelings towards possible benefit they might gain from the classroom community (Graff, 2003). As can be seen, diversity exists in

language learning classes, such as gender, cultural background, language proficiency, learning capabilities, and learners' characteristics. In blended learning courses, where technology is mediated to support the different types of learners, we should take those factors into consideration in the course design and planning lessons (Okaz, 2015).

2.5.4 Designing meaningful blended learning lessons for EFL learners

To create an effective blended learning course, the design is a very crucial part of it in order to provide learners meaningful and effective learning. As the cognitive theory of learning mentioned in 2.2.1, cognitive approaches also support the notions of vocabulary learning and knowledge retention related to this research. Regarding the design of blended learning instruction, the cognitive approach of Vygotsky's social constructivist was applied and took part in the process. Organising a blended learning environment in EFL classrooms could engage learners' cognitive skills with teacher and peer interaction, which offers them opportunities to learn vocabulary effectively and to boost vocabulary knowledge retention through collaboration and practice. It is, moreover, a good idea to explore the foundation of the design of a blended learning course. Tucker et al. (2017), as shown in Figure 2.17, suggest the stages of how to create a blended learning course, with detail of what to consider in each stage. According to the figure, there are four stages of creating a blended learning course. Firstly, it is advisable to set up the course objectives or goals based on learners' needs or preferences towards the course or academic learning experience. Secondly, after setting up the academic purpose for the course, it is very important to consider a number of factors, such as assessment, classroom infrastructure, learning environment, students' technology readiness and ability, and a way or model to allow them to make their own ultimate progress. After that, the timeframe, arrangement or planning of course content, and selection of resources should be set up and arranged. At the final stage, pre-pilot and pilot phases are suggested to conduct in order to obtain the tentative results to improve the quality of lessons, assessment, and resources. As can be seen, designing a blended learning

course requires well-planned stages and a number of factors to consider, in order to create an effective course which is in accordance with the students' needs, and brings them learning experiences.

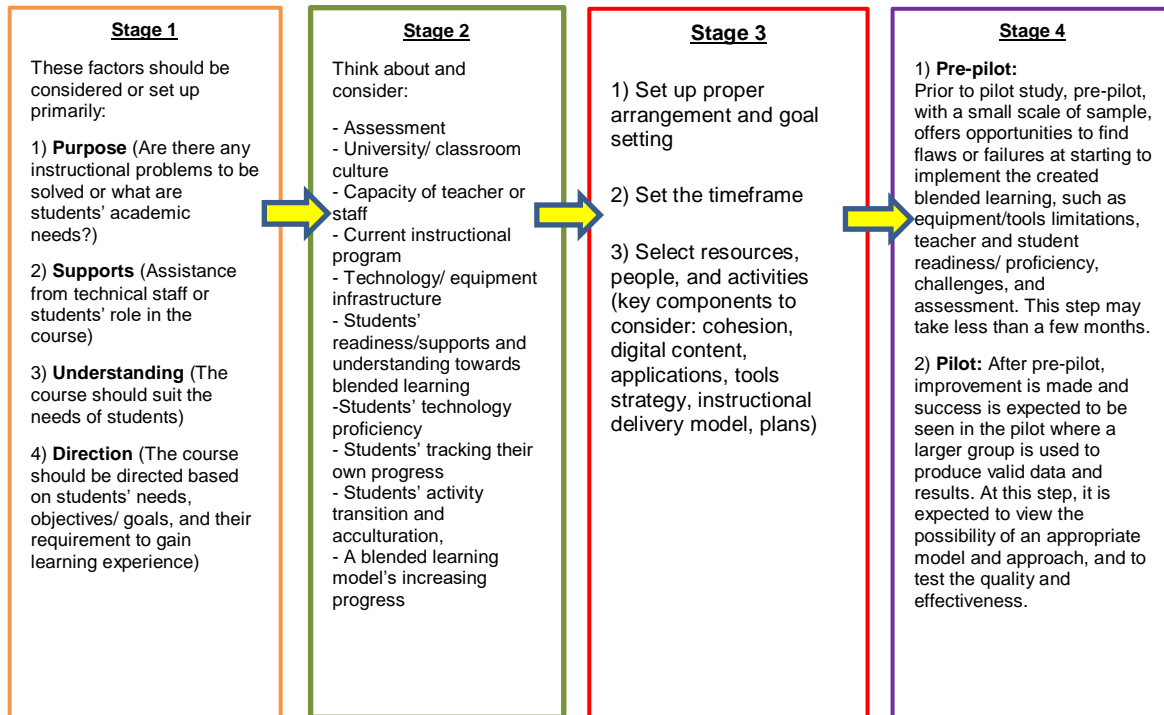


Figure 2.17 Stages to create a blended learning course (Tucker, Wycoff, & Green, 2017)

2.5.4.1 Technology and Digital Tools to Support a Blended Learning Course

Having stated the planning and stages of creating a blended learning course, we now look into appropriate digital tools to support the online approach in the course. With some limitations in the traditional classroom, digital tools can take part in the blended learning environment in order to provide effective instruction and a challenging learning atmosphere for students, including convenience for the course management. As technology has changed from time to time, using appropriate digital tools in the blended learning course, for different generations or students, needs to be taken into consideration. This is because the tools should suit the students' proficiency, and they should be confident to use the equipment that they are acquainted with, along with an online important information centre provided for them in the blended classroom setting (e.g. a website, blog, learning management system, mobile

communication application between class members) (Tucker et al., 2017). There are, however, concerns regarding problems or drawbacks, which are attributed to the use of technology. That is, using social networking tools and personal computers in class may cause students to be distracted and involved in multi-tasking, which may disturb their concentration during teaching and learning (Fried, 2007; Wood et al., 2012). Moreover, ineffective multimedia representations might have an impact on learners' cognitive load and their learning (Kalyuga, 2013). Therefore, it is probably a proper idea to plan and select the appropriate technology to allow smooth transitions, content delivery, interaction, and learning achievement. Furthermore, to optimise learners' memory capacities, the instructional multimedia formats should be taken into account in terms of levels of learners and their prior knowledge (Kalyuga, 2013), including avoiding task and technical complexities, and software incompatibilities which may occur during online instruction (Pino, 2008). Hence, Tucker et al. (2017) suggested types of digital platforms that can assist the blended learning classroom. From Table 2.5, several digital platforms and tools are suggested to use in the blended learning environment to support different learning activities and to produce an effective classroom for learners.

Table 2.5 Digital platforms and tools for blended learning classroom activities (Tucker et al., 2017)

Class activities	Suggested Digital Platforms/ Tools
Content delivery, class news	Website Blog An LMS (Mobile) communication applications
Group/ whole class conversations, sharing ideas	Asynchronous discussion platforms Video conferencing Communication applications Sharing news applications
Group work	Google Apps
Presentations, videos, infographics, websites, etc.	Online applications Chrome extensions Web tools

As can be seen, the suggested digital tools are possibly employed to manage the learning spaces that the teacher is required to create in the blended learning classroom. In vocabulary learning contexts where learners probably encounter a number of words to study and take a particular period of time for

retention, practice and review are very important for them to use the vocabulary fluently. Hence, learning inside the classroom can provide activities and assist them in words acquisition through contexts, concepts, understanding of meaning, and assistance of technology, both inside and outside the classroom, which may encourage learners to learn vocabulary in a meaningful or memorable way (Stanley, 2013). Some useful vocabulary learning activities incorporating technology and regarding deep and meaningful approaches are explored, selected and summarised in Table 2.6, in order to help students learn meaningfully and practice both inside and outside the classroom.

Table 2.6 Vocabulary learning integrated with technology (Stanley, 2013)

Classroom	Activities	Goals	Focus	Tools
Inside	Online word-game tournament	<ul style="list-style-type: none"> Using word games 	<ul style="list-style-type: none"> Increasing knowledge of vocabulary 	Websites
	Word puzzles	<ul style="list-style-type: none"> Encouraging vocabulary learning Creating pleasurable class atmosphere 	<ul style="list-style-type: none"> Defining words Extending knowledge of words 	Websites
	Word associations	<ul style="list-style-type: none"> Being aware of semantics Associating words 	<ul style="list-style-type: none"> Making associations between words 	Online visual dictionary websites
	Multiple-meaning presentations	<ul style="list-style-type: none"> Learning the meaning of new words Using concordance software 	<ul style="list-style-type: none"> Understanding words with multiple meanings 	A concordancer tool
Outside	Learner-generated quizzes	<ul style="list-style-type: none"> Vocabulary revision 	<ul style="list-style-type: none"> Recycling vocabulary 	A test/quiz generator website
	Memory posters	<ul style="list-style-type: none"> (group-work) Vocabulary revision 	<ul style="list-style-type: none"> Recycling vocabulary topics 	A digital poster-creation website
	Making words games	<ul style="list-style-type: none"> Vocabulary revision 	<ul style="list-style-type: none"> Learning vocabulary form Spelling 	A word-game website

From Table 2.6, possible learning activities integrating technology are presented and relevant to learning approaches which can lead learners to acquire words in a deep and meaningful way. Furthermore, with these activities, it is possible for them to develop their interaction or collaboration with

classmates and autonomous learning skills as well. Therefore, to blend technology into the classroom effectively, it is necessary to consider and select appropriate tools or software for particular or different tasks and activities, in accordance with students' needs, learning objectives, assessment and outcomes. In the next section, a potential classroom model will be explored in terms of its supportiveness and effectiveness to vocabulary learning for EFL learners.

2.5.4.2 The practical blended learning model for EFL Learners

As this research aims to investigate and provide a blended learning lesson for the EFL students, to design a blended learning course for these learners, possible classroom models are probably deployed, especially to support vocabulary learning. In fact, there are several types of classroom models that are potentially integrated into the blended learning environment. The flipped classroom method was created many years ago and originally used in chemistry and mathematics subjects, by assigning learners homework to study recorded lectures or content through an online platform, which was used for the class instruction or activities (Bergmann & Sams, 2012; Roehl et al., 2013). Instead, a classroom is where students ask questions regarding the self-study, collaborate in group work, practice through tasks or activities, and are focused as the center of learning (Bergmann & Sams, 2012; Tucker, 2012; Tucker et al., 2017). In many studies, the flipped classroom has been widely used in English language instruction to explore learners' increase in the language skills and their perceptions towards the method. It shifts the information taught in a traditional classroom setting to online self-study and allows students to apply it for the in-class practice (Hsieh et al., 2017; Stein & Graham, 2014; Tucker et al., 2017). In a large class, the flipped classroom is also likely to engage a number of students, with the use of interactive technology, to focus on their learning and instruction (Danker, 2015; Roehl et al., 2013; Schell, 2012). The advantage of the flipped classroom enables learners to undertake their online self-study outside the classroom and at their own pace. Additionally, many students who miss their classes, or those who are present in class, can watch

or re-watch the recorded or teacher-created lecture through the online platform as they want, to follow what they might miss from class or for the purpose of review (Tucker, 2012). Common lecture instruction is replaced particularly by practice applying the content they studied online. This way, during class time, students are able to apply their out-of-class knowledge to work with their peers, facilitated by teacher (Herreid & Schiller, 2013; Tucker et al., 2017). As can be seen, this model encourages them to be autonomous, by self-study outside the classroom, and to practice, collaborate with peers, or have inquiry, with support from the teacher who can monitor them around the classroom during tasks or activities. The overview of the design of a flipped classroom lesson is presented in Figure 2.18, which contains three steps in creating the lesson.

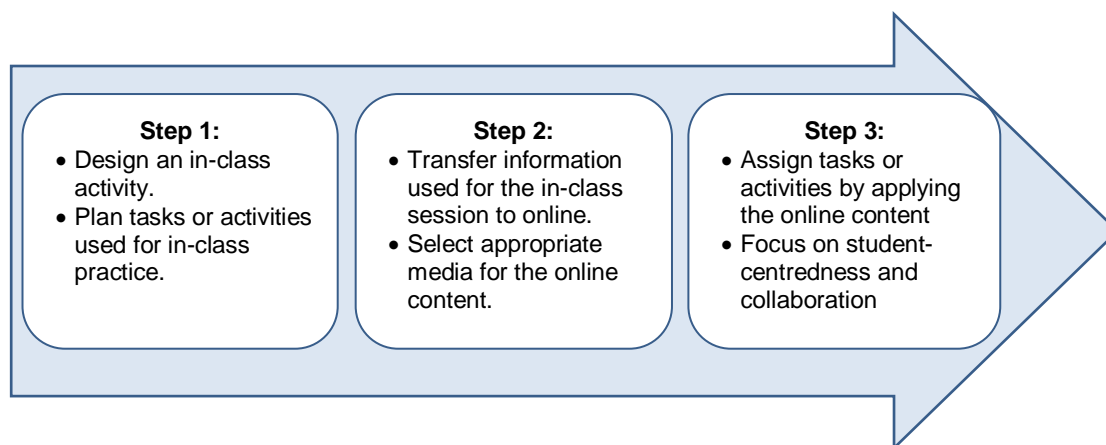


Figure 2.18 Designing the flipped classroom lesson (Tucker et al., 2017)

Figure 2.18 illustrates the steps of designing a flipped classroom lesson, which comprises three steps. To begin with, it is necessary to plan in-class activities or tasks in order to create content which engages students online. The in-class activities should stimulate them to, such as, ask questions, solve problems, deal with a situation, generate a discussion, or brainstorm. After the first step, it is important to consider the appropriate media to transfer the content to the online platform and to get them involved effectively. Students should be encouraged to be active and responsible for the online self-study. Giving extra marks or incentives for this part could be rewarding and motivating them to participate in this assignment. Finally, it is vital for them to apply the content

and fully utilise class time for practice and collaboration with peers. Tasks or activities are assigned to students at this stage, and the tasks should encourage student-centredness, collaborative participation, and interaction. Accordingly, in terms of instruction, the flipped classroom mainly comprises two sessions: before-class and in-class. Regarding the before-class session, students undertake the online assignment for self-study to prepare for the in-class session. During the class time, learners may be provided with a brief review on the before-class content used for tasks and practice, facilitated and monitored by the teacher. In this session, students are probably exposed to collaborative and task-based activities, such as a group discussion, presentation, conversational practice, or problem-solving tasks.

Dong (2016) suggested the application of the method for English teaching that, at the end of lesson, it is important for teacher to spend around 15 minutes to check students' feedback or ability to use what was learnt (e.g. vocabulary, writing, grammar) or to provide 15-minute interactive feedback after students completing the assigned task (Zainuddina & Perera, 2019). Additionally, games could be used for a review session as it encourages learners to actively use the language to communicate without hesitation of making grammatical mistakes (Ho, 2019). After-class communication is also necessary to help students explain or answer questions regarding the content they might not be able to catch during limited class time, and, more importantly, to gain their feedback on their learning and instruction (Dong, 2016).

Some limitations of this blended learning approach may exist. For example, students also need teacher facilitation to verify their out-of-class learning or check their understanding on the content, such as online or in-class Q&A sessions, discussion forums, surveys and quizzes (Francis, 2012; Hande, 2014). Apart from the instructors' additional work in preparing online lectures or lessons and in-class activities, students are required to take initiative and responsibility in their out-of-class self-study (Danker, 2015).

To create a flipped classroom, some key factors need to be considered, such as objectives or goals, Internet access, computer devices, the teacher's role. For example, if there is a limit of computer use and online access, a station rotation model is probably selected to use to guide students to learn various methods at each station. Meanwhile, an enriched virtual model may be used if the teacher wants to create the entire online course, but still needs to provide students optional face-to-face guidance or experience on-site at flexible times. Hence, to find the most appropriate ways for learners and provide them the best learning experience, apart from considering course objectives, technology access or the teacher's role, some other aspects are necessary to be taken into account, such as students' year level, characteristics, self-discipline and needs (Bath & Bourke, 2010).

The flipped classroom model tends to suit a skill subject as English because it requires a range of practice to enhance the learners' skills. Moreover, nowadays students are accustomed to using technology and social networking applications for various purposes. Therefore, using the flipped classroom model within the blended learning environment probably benefits learners because of opportunities for practice, collaboration, face-to-face interaction, and incorporating use of technology in learning the online content. However, it is also noted that some factors, related to in-class learning experience, such as students' motivation, nervousness or anxiety in using the language, and hesitation in having spontaneous interactions with peers or teachers, might affect their outcomes (Horwitz, Horwitz, & Cope, 1986). Another concern about using this blended learning approach arose, that is to say, students probably perceived the out-of-class self-study as additional workload which consumed more time, and they might need clarification when encountering the difficult content (Hsieh et al., 2017; Ping, Verezub, Badiozaman, & Chen, 2019). Moreover, teachers tended to be struggling to encourage students to undertake the self-study on their own, and seemingly students required explanations or to learn more under teacher's support (Engin, 2014a; Herreid & Schiller, 2013). Nevertheless, in the flipped learning model, as students are required to learn

the language content before class, class time would be mostly utilised for activities to promote their learning. Therefore, the more time is spent on practice, the more supportive flipped classroom possibly establishes satisfying learning outcomes (Hsieh et al., 2017).

A range of studies in EFL courses revealed positive results of the flipped classroom method in terms of improvement and perceptions. That is, the students or intervention group exposed to the flipped instruction outperformed the other group in the language skill improvement or enhancement (Alnuhayt, 2018; Alsowat, 2016; Anwar, 2017; Dong, 2016; Guy & Marquis, 2016; Hsieh et al., 2017; Wang et al., 2018; Zhang et al., 2016). Furthermore, learners in the flipped classroom setting seemed to be motivated and positive, and realised the benefits of the instruction that it could assist their learning (Alsowat, 2016; Mehring, 2015; Nanclares & Rodríguez, 2016; Zainuddina & Perera, 2019) and boost up peer interaction and collaboration (Ebrahimi, 2019). Related to this research, some recent and relevant studies on the flipped classroom strategy in teaching English vocabulary courses revealed positive results.

Alnuhayt (2018) conducted a study to examine the impact of the flipped classroom on students' vocabulary learning in an English course at a university in Saudi Arabia. The sample of 45 female students was randomly assigned into the experimental group (24 students) and the control group (21 students). The experimental group were provided with recorded snap lectures, which presented the introduction of new vocabulary. After watching the lectures before class, they took the vocabulary quizzes on the following day, which was the part of the evaluation criteria, and spent the class time on drill and practice. Meanwhile, the control group learned the new vocabulary in the classroom through lectures, taking notes, including pair work and dictionary practices. Homework exercises were assigned to do outside the classroom. To evaluate the participants' vocabulary development, a pre-test and post-test were employed, and a questionnaire was distributed to the experimental group to perceive their attitudes towards the flipped instruction. The results revealed a

significant difference in the mean post-test scores between the two groups. The experimental group performed better in vocabulary learning than the control group. In terms of perceptions, the learners exposed to the flipped classroom indicated positive attitudes towards the instruction, in terms of enjoyment and learning assistance. However, the researcher stated that, although some drawbacks of the flipped classroom were not mentioned in this study, other studies indicated disadvantages, such as extra work for teachers, difficulties in independent learning for some students, and technical problems.

Another study of the flipped classroom in the Chinese context investigated undergraduate students' vocabulary learning in a 16-week English course (Chen, 2018). The participants in this research were 126 second-year university students, with non-English majors. Based on their scores of the college entrance examination, their language proficiency was equally matched, and then they were randomly assigned to the intervention and control groups. Instruction in both classes comprised three sessions: before class, in class, and after class. The intervention group undertook a self-study assignment in the before-class session (watching videos, online discussion of the vocabulary usage), while students in the control group were assigned to preview vocabulary on their own. During the in-class session, the intervention group got involved in practice and activities under the teacher's facilitation, while the control group was studying through the lecture method. The after-class session offered the intervention group the vocabulary summary and online-sharing learning experience, while the control group was assigned to do homework. To evaluate the participants' vocabulary achievement, at the end of the course, they took two vocabulary tests which assessed their depth and breadth of vocabulary knowledge. The results that the intervention group outperformed the control group with much higher scores. The researcher concluded that there are positive outcomes by the use of the flipped classroom that assisted the participants in their vocabulary improvement.

Zhang et al. (2016) investigated the impact of the flipped classroom on university students' vocabulary learning in China. Two intact classes of first-

year English majors were used as the sample in this study. The scores of the college entrance exam and the final test from the previous semester proved the homogeneity of their language proficiency. The classes were assigned to the experimental group (32 students) and the control group (32 students). The experimental group was instructed in the use of the flipped classroom model, while the control group was exposed to the traditional method. The participants' vocabulary achievement was assessed by the first after-lesson test, and one week later they took the second vocabulary test to evaluate their vocabulary knowledge retention. The vocabulary learning results indicated that the experimental group performed better in the mean scores of both tests. In terms of their attitudes towards the flipped instruction, they revealed through the interview that they enjoyed the before-class content and viewed that it assisted them in vocabulary improvement.

Additional related research at a university in China examined students' vocabulary development with the use of the flipped classroom (Sun, 2016). Aligned with Zhang et al. (2016), two intact classes with a homogeneous level of proficiency were the sample of the study that was assigned to the experimental and control groups. The instruction in both classes consisted of before-class, in-class and after-class sessions. The experimental group was taught with the flipped classroom, which incorporated a mobile learning application and integrated with presentation, discussion, and interaction with peers and teacher during the in-class session, while the control group was exposed to the lecture. After class, the control group was provided with homework, and the experimental group received out-of-class exercises and revision. The results revealed that, after taking a vocabulary test, the experimental class outperformed the other group in the vocabulary development affected by the flipped instruction. Table 2.7 summarises the related studies to the impact of the flipped classroom on learners' vocabulary achievement.

Table 2.7 Related studies on the flipped classroom in vocabulary learning in EFL courses

Authors & study variable(s)	Setting/ Duration	Population/ Sample	Instruments	Approach	Analyses	Results
1. Alnuhayt (2018) Vocabulary learning Attitudes towards the flipped classroom	An English vocabulary course Department of English, Faculty of Education, at a university in Saudi Arabia One semester	Female students (aged 18-19), randomly assigned to experimental and control group	Pre-test Post-test Questionnaire	Flipped classroom method employed with the experimental group (new lessons delivered before class time), while the control one received the traditional method of lecture	Descriptive statistics (Mean, S.D.) Paired sample <i>t</i> -test	<i>Positive:</i> Significant difference in the experimental group's performance from the pre-test to post-test, which was higher than the control group Positive attitudes towards the instruction
2. Chen (2018) Vocabulary learning	An English vocabulary class at a university in China	Two classes, with 126 Sophomores of non-English majors (63% of female, 37% of male), assigned to the flipped classroom (class A) and traditional classroom (class B)	Two vocabulary tests (breadth and depth tests of vocabulary)	Flipped classroom instruction with before-class online videos, in-class activities, and after-class word summary	Descriptive statistics (Mean, S.D.) <i>F</i> -test	<i>Positive:</i> Class A (flipped method) scored higher than class B in both tests
3. Zhang et al. (2016) Vocabulary achievement Vocabulary knowledge retention	An English class at a university in the northern part of China	First-year students, majoring in English, divided into experimental (class A) and control (class B)	Two vocabulary tests (after-lesson test and one-week-later test) Interview	Vocabulary teaching was the combination of traditional and flipped classroom modes, containing pre-class learning, in-class activities and post-class exercises.	Descriptive statistics (Average, maximum-minimum)	<i>Positive:</i> Students' grade results in class A were higher than those in class B Vocabulary teaching through the flipped classroom model found to be effective.
4. Sun (2016) Vocabulary learning	A college English course at a Chinese university in Shanghai One semester	Two intact classes, assigned to one experimental and one control group, with same level of language proficiency	Vocabulary tests	Flipped classroom model, divided into 3 sessions: before class, in class, after class)	Descriptive statistics (Mean, Percentage)	<i>Positive:</i> The experimental group's scores were superior than the control group.

With respect to the related studies to the flipped classroom enhancing vocabulary learning, all results revealed students' positive learning outcomes, that is, the instructional model is likely to assist learner's improvement in vocabulary learning. Apart from the vocabulary learning, research conducted in

other ESL courses on the flipped classroom, nevertheless, indicated different results. For example, Oki (2016) revealed no significant difference in increasing academic performance between the intervention group and the other in the traditional classroom. However, their perceptions of the flipped strategy were positive in terms of the technology-mediated content representation and the replacement of class time with student-centred practice and clearer content explanation. Gross (2014) found that the non-intervention group could perform better in a test after reading difficult text, while the intervention group outperformed in the test which concerned a group collaboration. Evaluated by the summative test, their scores were approximate, with no significant difference. In terms of overall perceptions to instruction, the intervention group rather enjoyed working with peers or in-class collaboration. Some of the participants viewed that they felt uncomfortable when they had to deal with difficult text reading, and it would probably be struggling when they had to manage their own learning at home or outside the classroom (Gross, 2014; Moran, 2014).

As can be seen, based on the previous work, learning achievement affected by the use of the flipped classroom varied – with improvement or without a significant difference. The learners' perceptions towards instruction, however, tended to be positive. Therefore, the impact of the flipped classroom probably differs based on a diversity of learners and settings. Furthermore, Moran (2014) stated that the instructional model may not be suitable for younger ages, but may be suitable for older learners who are supposed to be able to self-regulate their own learning. Despite requiring careful steps and fully-supported facilities to create the effective flipped environment (Anwar, 2017), many studies still suggested that the flipped classroom framework is possible to bring about the positive instructional setting for learners in terms of group work, creativity, collaboration, and better academic performance.

Having discussed the blended learning approaches and design, including relevant factors regarding vocabulary teaching and learning, in the next

section, additional related studies to blended learning in EFL contexts will be presented to examine the similarities and differences related to this research.

2.6 Related studies to blended learning in EFL contexts

Previous related research on blended learning in English language courses generally investigated the effectiveness, learners' academic achievement and improvement, including their perceptions and attitudes towards the blended learning environment. In Thailand, corresponding to the main strategy in national education development, technology has been integrated into classroom in order to improve teaching and learning, and to enhance students' potential and skills (Simasathiansophon, 2014). From this study (ibid.), teachers and students perceived courses supported by blended learning approaches in a positive way, that is, they are useful for class communication, knowledge enhancement, and flexible time management. Another study (Chansamrong, Tubsree, & Kiratibodee, 2014) investigated Thai ESL students learning grammar through blended-cooperative learning which combined traditional teaching with cooperative learning, and using an e-book and a weblog in the experiment. With the learning atmosphere that suited the learners' capabilities, the results showed that the participants' post-test scores were higher than the pre-test, and their perspectives towards instruction were positive, as it could be useful for their learning. With respect to this research, related studies selected based on the key variables (blended learning, increasing vocabulary knowledge, and knowledge retention) are presented in following section.

2.6.1 Previous studies on blended learning regarding vocabulary learning and knowledge retention in EFL classrooms

Regarding the investigation of blended learning on vocabulary learning and knowledge retention in EFL contexts, most related studies revealed positive results in learners' improvement. Djiwandono (2018) conducted the impact of blended learning on reading abilities, vocabulary mastery, and grouping patterns in an English for Academic Purposes (EAP) course at a university in Indonesia. Two undergraduate classes were randomly assigned to the

experimental group, exposed to in-class and out-of-class sessions, and the control group taught in the traditional classroom setting. The participants took a pre-test, a post-test, and an open-ended questionnaire to gain in-depth information about their work collaboration. The results of the study revealed a significant difference in reading abilities and vocabulary development between the two groups, that is, the experimental group gained higher scores in reading comprehension and vocabulary. Regarding their group work collaboration, both groups shared similar results in grouping patterns and cooperation – they tended to maintain working with the same group rather than switching to other groups.

Karaaslan, Kilic, Guven-Yalcin, and Gullu (2018) explored students' reflections on their vocabulary learning through use of games and activities in synchronous and asynchronous modes, using web tools and online exercises, at a university in Turkey. The sample of 45 second-year students who enrolled in an English preparatory program took part in this study. In the classroom, the participants took part in activities or games in a synchronous way. Furthermore, they were assigned to do more out-of-class practice on vocabulary through the asynchronous mode. After 8-week period of implementation, they were invited to complete a self-report questionnaire, with Yes/No responses and open-ended questions. The results indicated that the majority of the participants had positive views on the use of games and activities, as they found them meaningful and effective. Only a few of them might find the activities uninteresting and difficult to follow through due to their limited language background knowledge and lack of motivation.

A study conducted with 80 mechanical engineering students at a university in Indonesia (Pertiwi, 2018) investigated their vocabulary mastery regarding the technical terms used in their academic field. Due to heterogeneity, the participants were divided into three competence groups: fast learners, slow learners, and mixed learners. To collect the data, a journal log, observations, a questionnaire, interviews, and scores from students' mid-term test, workshop visits and written tests were used as the research tools. This action research

was divided into two cycles (Cycle 1 and Cycle 2). In Cycle 1, the problems of vocabulary learning were identified through students' interviews and a questionnaire, and the blended learning lessons and tests were trialled. In Cycle 2, after the lessons were improved, the participants were taught and observed by the teacher in the blended learning environment. They took the tests and questionnaire, and participated in the interview session. The results indicated students' better vocabulary achievement, that is, students who achieved grades A and B increased by 15%, and those who achieved C and D decreased approximately 16%. Furthermore, in terms of their reflections on the blended learning approach, they were positive and satisfied with the online session which provided them a variety of tasks and interactive feedback, and the face-to-face session of the workshop visit that, based on their opinion, was still important to ensure their understanding of the subject through personal interaction.

Another study investigated the effects of the blended learning approach on students' vocabulary learning at a university in Russia (Vasbieva, Klimova, Agibalova, Karzhanova, & Birova, 2016). With one-group design, the sample consisted of 22 third-year undergraduate students, exposed to in-class practice and group work and technology-mediated self-study outside the classroom. The participants took a pre-test at the beginning of the experiment, and after a two-month treatment, they took a post-test. The data analysis indicated statistical significance of a positive relationship between the scores in pre-test and post-test. Therefore, it was concluded that the use of blended learning instruction had a positive effect on the learners.

Mashhadi, Hayati, and Jalilifar (2016) investigated students' vocabulary development through the use of podcasts (Podcast lessons package) blended in an English course at an Iranian university. The sample was specified among 132 students after taking a vocabulary levels test (VLT), and they were randomly assigned to three groups: the self-study, the conventional method, and the podcast-mediated learning. After the treatment, the participants took two weekly vocabulary post-tests – 32 formative tests in total. All groups took

part in an interview and attitude questionnaire towards instruction. The results revealed that those exposed to the podcast-mediated blended learning outperformed the two other groups, with positive attitudes towards using the tool in the course.

A study on blended learning regarding students' increase in English language skills was conducted in an integrated skills English language course, at a university in Thailand (Banditvilai, 2016). The sample comprised 60 second-year undergraduate students in English majors. They took a pre-test to determine their homogeneity in language ability at the beginning of the course. Then the participants were randomly assigned into the experimental group, exposed to the e-learning lessons, and control group, taught in the traditional setting. After the treatment, the subjects took an achievement test. Finally, the experimental group took a questionnaire to perceive their attitudes towards the learning environment, and 15 students from this group took part in semi-structured interview. The results revealed a significant difference in the mean scores of achievement between the two groups, which also indicated that the experimental group outperformed their counterpart in English language skills and achievement. Most students from the experimental group revealed positive feedback towards the instruction, while a small number of them expressed negative views on technical problems and some drawbacks of the e-learning tools that could not support them for a particular language skill.

Khalili, Tahririan, and Bagheri (2015) investigated medical science students' vocabulary learning in an ESP course at a university in Iran. The sample of 120 students was divided into the experimental group, exposed to the blended learning environment integrating multimedia software in vocabulary teaching, and the control group, taught in the traditional setting. The participants took the vocabulary pre-test and post-test to assess their vocabulary improvement after the treatment. Furthermore, classroom observations were conducted to explore the students' interaction, engagement and the classroom atmosphere. The results revealed a significant difference in the mean post-test scores between the two groups. The experimental group outperformed the other in vocabulary

enhancement. Based on the results derived from the observations, students from the experimental group tended to enjoy learning through the use of multimedia software and be more engaged than the traditional class. Moreover, the researcher stated that the blended learning class was found to learn new words better than their counterpart.

A study conducted at a university in Thailand (Suwantarathip & Orawiwatnakul, 2015) investigated students' vocabulary enhancement through the use of blended learning instruction in a fundamental English course. Eighty students from two classes, with 40 each, were used as the sample, and they were randomly assigned to the experimental and control groups. The experimental group was taught in the blended learning setting which employed SMS-based exercises in the vocabulary instruction, while the control group received paper-based exercises in the traditional classroom. The participants took the pre-test and post-test to evaluate their vocabulary development and they completed a questionnaire to perceive their attitudes towards instruction and vocabulary improvement. The results revealed a significant difference in the mean post-test scores between the two groups. The experimental group performed better in the vocabulary post-test, that is, the approach tended to be effective to improve their vocabulary learning.

Another study examined vocabulary enhancement through the use of games in the blended learning environment at a university in Malaysia (Maria & Othman, 2015). Forty students were divided into the experimental and control groups, comprising 20 students each. The experimental group was exposed to the intervention of games blended into instruction, while the control group learned vocabulary through conversation practice in the traditional setting. The participants took a pre-test and a post-test to assess their vocabulary achievement. Moreover, the participants took a questionnaire to perceive their attitudes towards vocabulary learning with the use of games. The results indicated that the experimental group performed slightly better in the vocabulary post-test scores, and most of them had a positive perception of incorporating games into the classroom activities.

Khodaparast and Ghafournia (2015) investigated the effect of online and offline approaches on students' vocabulary achievement at a university in Iran. The sample was specified among 100 female EFL learners. Then they were randomly divided into four groups, containing 25 students each: offline, online, blended and control. The offline group was exposed to an asynchronous teaching method, with the use of, such as CDs, multimedia software, video clips, or emails. The online group was exposed to a synchronous learning method, utilising, such as Skype, video conferencing, online quizzes, and an interactive online discussion. The control group was taught in the traditional setting, without the use of digital tools. The blended group was exposed to the combination of the aforementioned methods: offline, online, and traditional approaches. The participants took a pre-test to prove the homogeneity in their pre-existing vocabulary knowledge. After the course they took a post-test and the results showed that the blended group's mean scores in the post-test gained the highest vocabulary achievement of all groups. Moreover, the mean scores in the blended group were significantly different from the other groups. Therefore, it was probably concluded that the combination of the approaches had an impact on students' vocabulary learning.

A study was conducted to examine students' vocabulary development through the use of Internet video clips in the blended learning environment, at a university in Korea (Jung & Lee, 2013). An intact class of 21 students was used as the sample for one-group design, and eight students were selected as the focused group for interview. Vocabulary pre- and post-tests were employed to examine their vocabulary development. For qualitative data, students' reflective journals, observations, interviews and a questionnaire were used to collect the information about their experiences during the blended learning course which incorporated video clips in vocabulary learning. After the treatment, the results revealed that the participants had positive perceptions and experiences with vocabulary learning through the use of video clips during the course. Regarding their vocabulary development, it showed a significant difference

between pre-test and post-test, analysed by the paired-samples *t*-test, which indicated the development in their vocabulary learning.

Similarly to his recent study on the blended learning approach to enhance vocabulary learning, Djiwandono (2013) investigated the effectiveness of the approach on students' vocabulary learning and their attitudes towards the blended learning experience at an Indonesian university. An intact class of 21 students was used as one-group design, with pre-test, post-test, and open-ended questionnaire as the research tools. The participants in an EFL course were exposed to the blended learning environment, consisting of virtual learning methods (learning vocabulary from a blog) and a classroom session. The results revealed both positive and negative outcomes, that is, the students' vocabulary size level increased, but their new words mastery from the online blog slightly decreased, probably due to lack of practice or difficulties in memorising new vocabulary. Regarding their perceptions towards the approach, they indicated positive experiences of learning through the blended learning environment, and teacher facilitation of the online content was still necessary for them.

Tehrani and Tabatabaei (2012) investigated the effect of a blended learning approach on learners' vocabulary achievement at a university in Iran. Sixty female adult students took part in this study, and they were selected based on their proficiency after taking the placement test. Then, they were assigned to the experimental group, exposed to the Nicenet online learning platform, and the control group, taught with the traditional method. To evaluate their vocabulary achievement, a pre-test and post-test were employed at the beginning and after the treatment, respectively. Furthermore, a computer literacy questionnaire was distributed to investigate their computer knowledge and skills, including the frequency of use of computer. After the experiment, the results showed a significant difference between the experimental and control groups, that is, the experimental group performed better than the other group in the mean post-test scores. Additionally, a significant difference between pre-test and post-test was found in the experimental group. Regarding their

computer literacy, the results revealed positive opinions in their computer use and knowledge.

Meanwhile some previous work revealed no significant difference in learners' vocabulary development. An experimental study in Turkey carried out by Tosun (2015) investigated "the effects of blended learning strategy in teaching vocabulary and the students' perceptions of blended learning approach in learning vocabulary." The sample was divided into two groups; experimental and control. The experimental group was instructed by blended learning approaches, while the control group learned the same content by traditional teaching. The teaching period took six weeks, and then the vocabulary paper-based test was administered with both groups. The results revealed that their test scores were similar and not significantly different. According to the students' perceptions, they seemed to enjoy the vocabulary learning, but did not like learning tools used in the instruction, including the teacher's blend of the digital tools and in-class activities. Finally, the researcher recommended that it is necessary to consider learners' needs or interests by probably conducting needs analysis before choosing online or digital tools for a particular group of learners.

Likewise, another related study (Alshwiah, 2010) was conducted at a university in Saudi Arabia to examine the impact of a blended learning strategy on premedical students' vocabulary learning. The sample comprised 50 students, randomly assigned to the experimental group (28 students), exposed to the online unit of English medical vocabulary, and the control group (22 students). The participants took midterm and final exams, and their achievement scores between the two groups were analysed to explore if a difference existed. The results indicated no significant difference in the vocabulary test scores; however, based on the mean exam scores, the control group performed better than the experimental group, that is, the blended learning approach did not probably affect their vocabulary improvement. The possible reasons could be a low rate of online participation, lack of motivation to do the online assignments, heavy study and workloads, and difficulties in being an independent learner.

With respect to the impact of blended learning towards learners' knowledge retention, there are various studies on different academic subjects; however, there are not many of them that are relevant to vocabulary learning in EFL contexts. One study previously mentioned in 2.5.4.2 (Zhang et al., 2016) revealed positive results. Meanwhile, a similar study investigated the impact of the blended learning approach in an English grammar class on students' improvement and knowledge retention on the passive structure at a language institute in Iran (Arfaorafiee & Ameri-Golestan, 2015). The sample of 44 EFL learners was specified among 75 learners who previously took a placement test, and then those 44 learners were randomly assigned into two experimental groups [blended learning group (15), web-based group (15)] and one control group (14). The blended learning group was exposed to the combination of the traditional method and web-based grammatical content, and the web-based group particularly received the content through the online platform, while the control group was taught in the traditional method. The participants took a pre-test at the beginning of the course. In the last session of the study, they took a post-test, and took a delayed test one week after that. The results revealed a significant difference in the mean post-test and delayed test scores between the experimental and control groups. The control group outperformed the experimental groups (blended and web-based learning). It was suggested that the blended learning might not be effective for students' achievement and knowledge retention, and might not be suitable for every learner.

Learners' perceptions and attitudes are the other important factors to evaluate the quality or feasibility of the blended learning setting. As can be seen from the aforementioned related research, the results revealed learners' positive feedback on blended learning instruction, their learning improvement, and out-of-class communication with peers and teacher. Some of the research work additionally revealed a part of negative views (Banditvilai, 2016; Tosun, 2015) derived from, such as technical problems with computers or networks, dissatisfaction on the technology-mediated tools prepared by the teacher, and students' lack of motivation in web-based vocabulary learning and out-of-class

self-study. Additional related studies to other blended learning courses revealed positive responses in terms of improvement, learning flexibility and management, interactive communication with peers, including received feedback and support from instructors (Ekawati et al., 2017; López-Pérez et al., 2011; Shantakumari & P, 2015; Sucaromana, 2013; Usta & Özdemir, 2007; Waha & Davis, 2014). Accordingly, Zumor, Refaai, Eddin, and Al-Rahman (2013) also added that, through their students' perceptions, their reading and vocabulary knowledge have improved under the blended learning environment which brought them more confidence of language learning through technology, and benefited their learning with feedback and opportunities to communicate with peers and teacher. However, they stated some drawbacks of the approach, such as possible chances of cheating, difficulties in understanding online content, technical problems, and access to the Internet. Therefore, they gave some suggestions, such as clear instructions for self-study, creating more effective online interactions, and pre-course training for students.

In different courses, variation in the blended learning proportion probably occurs, and students' feedback is needed to suit their learning capabilities (Waha & Davis, 2014). In addition, factors that have significant impacts on their satisfaction towards the blended learning course were instructor characteristics and teacher facilitation (Dang et al., 2016). Furthermore, Gülbahar and Madran (2009) found that students' perceptions and satisfaction correlated with their computer and internet background knowledge. Thus, students should be provided with meaningful lessons and assessment, and opportunities to support their technical literacy. Tosun (2015) noted that it is necessary to consider learners' needs or interests by probably conducting needs analysis before choosing the online or digital tools for a particular group of learners. From the students' perspective, the digital tools assist learning, but face-to-face interaction between instructors and students is still considered important as it creates the feeling of connections or social interaction between them (Banditvilai, 2016).

As discussed above, most of the previous related work investigated university students' increase in vocabulary learning through blended learning instruction. Positive results were indicated in learners' improvement and achievement. They found that the approach or medium played an effective role on their vocabulary development, while some of the studies revealed the different results of the improvement of the participants' vocabulary learning. In other words, there was no significant difference in vocabulary development between experimental and control groups, and no impact of the blended learning approach was found on the experimental group. However, learners tended to have positive attitudes towards the blended approach and environment. Table 2.8 summarises the aforementioned related studies to blended learning instruction on vocabulary learning at the tertiary level.

Table 2.8 Related studies on blended learning regarding English vocabulary learning in EFL courses at the tertiary level

Authors & Study variables	Setting/ Duration	Sample	Instruments	Blended learning approach	Analyses	Results
1. Djwandono (2018) Reading abilities Vocabulary mastery Grouping patterns	A reading course, Faculty of Economics and Business, at a university in Indonesia 6-week instruction (run twice a week)	Two undergraduate classes, randomly assigned to experimental and control groups	Pre-test Post-test Open-ended questionnaire	In-class lecture sessions, followed by online sessions (out-of-class group assignment), and then presented/ shared the group work in the classroom in the following week	Descriptive statistics (Mean, S.D.) ANCOVA Mann-Whitney U Test	<i>Positive:</i> Experimental group gained higher reading skills and vocabulary enhancement than the control group No significant difference in grouping patterns
2. Karaaslan et al. (2018) Vocabulary learning	An English preparatory program, at a university in Turkey 8-week implementation	45 second-year intermediate-level preparatory school students	Self-report questionnaire (with Yes/No response and open-ended questions)	Learners were trained for the web tools used in the learning process. They played games in class (both with team and as a single player) through the synchronous mode, and asynchronous activities were assigned to complete outside the classroom. They were evaluated through the web-based exercises, with actual points given.	Frequency analysis Content analysis	<i>Positive:</i> The majority of participants had positive ideas and feeling about the game activities A few respondents were not interested in the activities, or had a difficulty to follow through the game instructions due to their limited language background knowledge
3. Pertiwi (2018) Vocabulary mastery	A vocabulary course for mechanical engineering, at a university in Yogyakarta, Indonesia One semester Conducted in two cycles (Cycle 1 and Cycle 2)	Two classes of 80 mechanical engineering students, divided into 3 competence groups (fast, slow and mixed learners)	Journal log Observation Questionnaire Interview Midterm test scores Workshop participation scores Written test	Consisting of one online class and one face-to-face class (workshop session)	Frequency Percentage	<i>Positive:</i> In vocabulary achievement, students who achieved grades A and B increased, while the number of those who achieved D and C decreased. Most students had positive feedback on the blended learning lessons.

Table continued

Authors & Study variables	Setting/ Duration	Sample	Instruments	Blended learning approach	Analyses	Results
4. Banditvilai (2016) Language skills Attitudes	A Thai university One semester	A class of 60 second-year students in English majors (aged 18-21), divided into experimental and control groups	Pre-test Post-test (Achievement test) Questionnaire Interview	E-learning lessons + activities for experimental group	Descriptive statistics (Mean, S.D.) Independent <i>t</i> -test	<i>Positive:</i> Significant difference in mean post-test scores between two groups The experimental group gained higher mean scores in post-test than the control group. Both positive and negative feedback on the learning environment
5. Mashhadi et al. (2016) Vocabulary development	A vocabulary experimental treatment, an Iranian university of Medical Sciences One semester	132 volunteer undergraduate students (with low scores), divided into 3 groups: self-study, conventional learning, and podcast-mediated learning)	Vocabulary Levels Test (VLT) Vocabulary tests (formative assessments) Podcasts lessons package Questionnaire Interview	Based on classroom and non-classroom modes which incorporated podcasts into practice	ANOVA A Scheffe test Descriptive statistics (Mean, S.D.)	<i>Positive:</i> Students who received podcast-mediated blended instruction outperformed the two other groups Positive attitudes in using podcast as the teaching medium
6. Vasbieva, Klimova, Agibalova, Karzhanova, and Birova (2016) Vocabulary learning	International Finance English Course, Financial University, Moscow, Russia 2-month training	22 undergraduate students studying International Finance English	Pre-test Post-test	Student used digital visual learning tools to practice vocabulary lessons outside the classroom. Pair and group work was organised for communicative and collaborative activities for in-class sessions.	Dependent <i>t</i> -test Sandler's A-test Descriptive statistics (Mean, S.D.)	<i>Positive:</i> Students' scores on pre-test and post-test had statistically significant difference. The training had positive effect on students' vocabulary learning. Positive feedback on the blended learning approach

Table continued

Authors & Study variables	Setting/ Duration	Sample	Instruments	Blended learning approach	Analyses	Results
7. Khalili et al. (2015) Vocabulary learning	An ESP course at a university in Iran	120 medical science students (divided into experimental and control groups)	Vocabulary pre-test Vocabulary post-test Observations	The experimental group was taught in the blended learning setting incorporating multimedia software. The control group was exposed to the traditional method of vocabulary teaching.	Descriptive statistics (Mean, S.D.) Independent <i>t</i> -test	<i>Positive:</i> Significant difference in mean post-test scores between two groups The experimental group outperformed the control group in vocabulary enhancement Positive feedback and higher motivation in the experimental group regarding vocabulary learning
8. Khodaparast and Ghafournia (2015) Vocabulary achievement	An Iranian university	100 female Iranian EFL first-year students majoring in English teaching, divided into 4 groups (25 each): offline, online, blended, and control	A placement test Post-test	Offline group: exposed to asynchronous learning setting, e.g. CD, video clips, software, emails. Online group: exposed to synchronous learning setting, e.g. Skype, video conference, online quizzes Blended group: taught with combined traditional, online and offline classroom activities Control group: taught without digital tools	ANOVA Descriptive statistics (Mean, S.D.)	<i>Positive:</i> Blended learning approach significantly influenced learners' vocabulary improvement and achievement Learning vocabulary through computer-assisted teaching approaches found to be effective.
9. Maria and Othman (2015) Vocabulary enhancement	A vocabulary training at a Malaysian university	40 students (experimental = 20, control = 20)	Pre-test Post-test Game activities Questionnaire	Using three particular types of games and participation with peers (for a self-regulated approach) in the blended learning environment	Descriptive statistics (Mean, S.D.)	<i>Positive:</i> Incorporating games into the blended learning environment was found to be effective for vocabulary learning and enhancement Overall positive attitudes on the vocabulary teaching method

Table continued

Authors & Study variables	Setting/ Duration	Sample	Instruments	Blended learning approach	Analyses	Results
10. Suwantarathip and Orawiwatnakul (2015) Vocabulary enhancement	A fundamental English course, at a university in Thailand	Two classes of 40 students each, randomly assigned to the experimental and control groups	Pre-test Post-test Questionnaire	The experimental group was exposed to the blended learning approach, employing SMS-based exercises. The control group received paper-based exercises.	Descriptive statistics (Mean, S.D.) Independent <i>t</i> -test	<i>Positive:</i> A significant difference in the post-test scores between the two groups The experimental group outperformed the other group in the mean post-test scores, Positive attitudes on the blended learning approach
11. Tosun (2015) Vocabulary knowledge	A university, Ankara, Turkey 6-week instruction	40 intermediate-level students registered an intensive English course (experimental = 20, control = 20)	Pre-test Post-test Interview	Students used digital visual learning tools to practice vocabulary at their own pace. Collaborative and communicative activities were organised in the classroom.	Descriptive statistics (Mean, S.D.) Independent <i>t</i> -test	<i>Negative:</i> No improved achievement found Both positive and negative attitudes on blended learning instruction
12. Jung and Lee (2013) Vocabulary development Attitudes	A second language listening comprehension class, at a language institute at a university, Seoul, Korea Two hours per week, totally 12 weeks	21 Korean university students Two focused groups, with 4 students each	Vocabulary tests (pre-test & post-test) Students' reflective journal Observations Interviews Questionnaire	Each class consisted of offline and online sessions. In the offline session, students watched a video clip, and were assigned individual and group work. In online session, they watched the video clip again, and completed implemented activities online. Instructor monitored their work and provided feedback on Bulletin Board System.	Paired <i>t</i> -test Pearson's correlation Descriptive statistics (Mean, S.D.)	<i>Positive:</i> Overall, students had positive perspectives towards blended learning incorporated by Internet video clips. Students had a significant increase in their post-test scores
13. Djiwandono (2013) Vocabulary learning	An organised vocabulary class setting, at an Indonesian university	21 students in an intact class	Pre-test Post-test Questionnaire	Traditional class sessions combined with individual learning from a blog	ANOVA Descriptive statistics (Mean, S.D.)	<i>Positive & Negative:</i> Students' vocabulary size level increased Their new words mastery from the online blog slightly decreased

Table continued

Authors & Study variables	Setting/ Duration	Sample	Instruments	Blended learning approach	Analyses	Results
	A 16-week semester					between the first and the second sessions. Favorable perceptions in the blended learning by most learners
14. Tehrani and Tabatabaei (2012) Vocabulary achievement	A vocabulary training for adult learners, Isfahan city, Iran 20 sessions of vocabulary instruction	60 Female adult EFL learners with intermediate level of English language proficiency (assigned to experimental and control groups)	Oxford Placement Test Questionnaire (Computer literacy) Pre-test Post-test <i>Nicenet</i> (a virtual classroom platform)	Normal class time was incorporated with using <i>Nicenet</i> , an online virtual classroom to communicate between teacher and students outside the classroom	Independent <i>t</i> -test Descriptive statistics (Mean, S.D.)	<i>Positive:</i> Positive attitude towards computer use The experimental group exposed to the blended learning environment outperformed the control group, with a significant difference of the participants' scores between pre-test and post-test
15. Alshwiah (2010) • Vocabulary achievement	English Course for premedical students, Arabian Gulf University	50 medical students whose language entry exam scores were lower than 60% (experimental group = 28 students, control group = 22 students)	Online unit (for medical vocabulary) Midterm & final exams	Online unit was used as out-of-class extensive practice. Students were exposed to face-to-face sessions, for wrapping up, after the online section was completed	MANOVA Shapiro-Wilk test Mann-Whitney Exact test	<i>Negative:</i> No significant difference between experimental and control groups Students' achievement was not improved. The control group performed slightly better in the midterm test
** 16. Arfaorafiee and Ameri-Golestan (2015) Achievement in grammatical knowledge Knowledge retention	An English grammar course, at a language institute in Iran	44 EFL learners, divided into 3 groups: blended learning (15), web-based (15), control (14)	Placement test Pre-test Post-test Delayed test	Blended learning group received the combination of traditional methods and web-based content of passive structure. Web-based group received the content particularly through the web. The control group was taught in the traditional method.	Descriptive statistics (Mean, S.D.) One-way ANOVA	<i>Negative:</i> The control group outperformed the experimental groups in the mean post-test and delayed test scores. The approach did not play an effect role on students' improvement and knowledge retention in grammar (passive structure).

** A similar study investigated the impact of blended learning on students' grammatical knowledge in an EFL course.

2.7 Conclusion to this chapter

The theories and literature were helpful to the design of the blended learning instruction in the way that they provided the ideas to plan and scaffold the lesson plan by incorporating activities to support learners' cognitive processes and memory in language learning, including interactivity with teacher and peers. The blended learning approach employed in this study involves the cognitive theories of learning which helps understand cognitive or memory processes and functions which could be of support in vocabulary learning for the EFL learners. Furthermore, Vygotsky's social constructivist conception of cognitivism also suggests the idea of language learning through social interaction with teacher assistance and peer collaboration, including the support and good use of technology. With memory processes involved in vocabulary learning and vocabulary knowledge retention, the learning process through social interaction with teacher and peers, along with technological tools could provide learners opportunities to practice through classroom tasks or activities and undertake self-study outside the classroom to learn independently or become an autonomous learner.

As technology or computer-mediated instruction has played an important part in teaching and learning foreign languages, including students' acquaintance with current technological tools and applications, educational institutions tend to incorporate the online approach to support the traditional or face-to-face learning. Research on blended learning has shown the principles and benefits of combination between face-to-face and technology-enhanced learning approaches. The integration of selective digital tools and classroom activities probably enhances students' learning performance and course effectiveness, and solve time constraints and institutional budget limits. With the blends in an EFL course, students are probably offered an opportunity to be exposed to the participation and interaction in the online learning environment or community, along with the advantageous practices of face-to-face learning.

A range of blended learning studies have been conducted in the EFL courses to investigate students' vocabulary learning at the tertiary level.

Most of the studies indicated positive results in learners' vocabulary development affected by the blended learning approach, while some of them revealed negative learning outcomes or no improvement through the learning environment. In terms of perceptions and attitudes towards blended learning, most participants from these previous studies gave positive feedback and expressed satisfaction with the courses.

There are similarities between previous work and this current study as follows:

- 1) This research is looking into the impact of the blended learning approach on students' vocabulary learning in an EFL course at the tertiary level, and the flipped classroom is selected to incorporate in course instruction.
- 2) This study is conducted in a quasi-experimental design which is consistent with previous studies of Djiwandono (2013), Jung and Lee (2013), Karaaslan et al. (2018), Tosun (2015) and Vasbieva, Klimova, Agibalova, Karzhanova, and Birova (2016). That is to say, there are intact classes and it is not possible to organise the random assignment as it is done in the experimental design. The sample in this study is also divided into experimental and control groups in order to examine a significant difference in vocabulary achievement between them.
- 3) Apart from investigating the vocabulary learning, this study also explores the subjects' perceptions and attitudes towards the blended learning environment.

However, the differences of the current study from the previous research are presented in the following aspects:

- 1) As most previous studies examined particularly vocabulary or academic achievement through the use of blended learning or the flipped classroom strategy, this study will not only investigate the impact of the flipped classroom on the learners' vocabulary development, but also the vocabulary knowledge retention after the course ends.
- 2) This study will examine the vocabulary learning and knowledge retention different aspects: gender, academic majors, registered classes, and the relationships between the learners' language proficiency, pre-existing

vocabulary knowledge, increasing vocabulary knowledge and vocabulary knowledge retention.

- 3) Not only looking into the students' perceptions and attitudes, but this study will also examine the teacher perspectives towards blended learning instruction, which will reflect the feasibility of blended learning instruction.

To conclude, this research will investigate the use of blended learning towards university students' increase in vocabulary knowledge and knowledge retention. A blended learning approach selected to use in this study is the flipped classroom. It considerably focuses on in-class practice and activities, which is suitable for a skill subject as English language learning that requires regular practice. With this approach, students spend extra time outside the classroom for self-study regarding the content they have to study before class and apply it with in-class tasks. Although it causes them to spend more time outside the classroom, the additional time they spend on learning could benefit their study. Furthermore, apart from the vocabulary development, this study will examine the extent of feasibility of the approach in the EFL context from the various aspects, such as gender, academic majors and different registered classes.

As literature and related previous studies regarding vocabulary knowledge retention, vocabulary learning and teaching, differences in language learning, and blended learning instruction discussed in this chapter, the next chapter will explain the research methods, procedures, the study phases, including statistical analyses into details.

3. Research Methodology

3.1 Introduction

To begin with, as stated in the introduction chapter, the research problems were derived from three situations as illustrated in Figure 3.1.

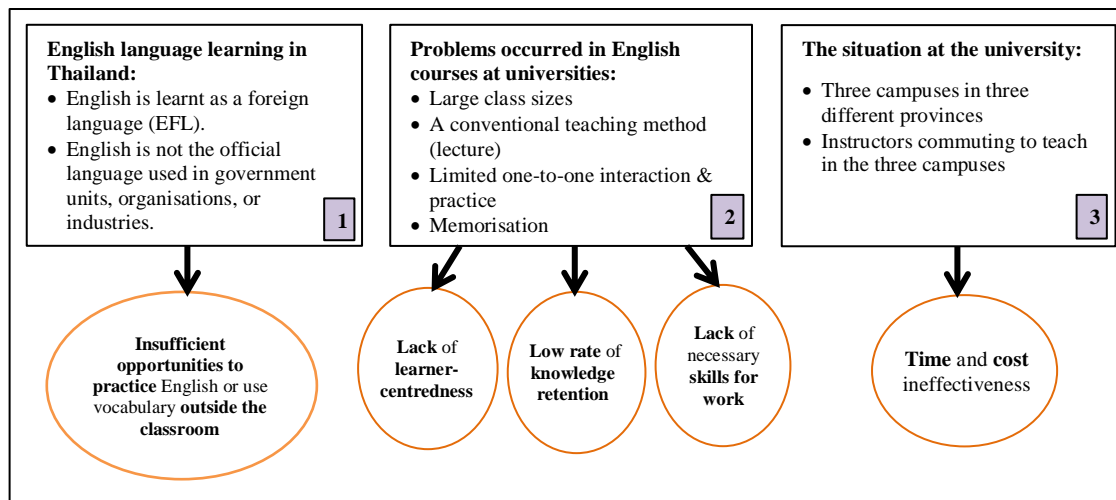


Figure 3.1 Research problems

According to Figure 3.1, the research problems stemmed from the situations of the English language learning in Thailand, English courses at universities and instructional administration at the University. Due to these situations, there occur limited opportunities for students to use English outside the classroom, there is a lack of learner-centredness, a low rate of (vocabulary) knowledge retention, which develop insufficient necessary skills for work, which result in poor time and cost effectiveness. As explained in the previous chapters, vocabulary learning is likely to be one of the most important fundamentals in language learning (Barcroft, 2004; Hógain, 2012; Nation, 2001; Shabani et al., 2014). Vocabulary knowledge also plays a crucial part in using the language whether in academic or career contexts (Lewis, 1993; Wilkins, 1972), for example, in communication, we tend to understand the meaning of sentences through key words rather than grammar. Therefore, vocabulary knowledge is an important part in using the language fluently (Schmitt, 2000). To reach that goal, the teaching method plays a vital part in supporting learners. Among various teaching methods, the blended learning approach is likely to enhance learners' skills through the combination and advantages of face-to-face interaction and the use of technology (Blackboard, 2015; Garrison & Vaughan, 2008; Köse, 2010;

Tucker et al., 2017). In face-to-face classes, the learning environment allows learners to be engaged and responsive and to gain teacher's immediate feedback and support, or interpersonal relationships in a collaborative environment (Fairchild, 2012; University of Washington, 2013). Furthermore, the use of technology and online components incorporated into courses can bring learning flexibility in terms of time and place for study, accessing or reviewing asynchronous online content, and, for teachers, students' online records or assessment can be useful to follow up their progress and improvement (Fairchild, 2012; Smith, 2013; University of Washington, 2013). Therefore, with these advantages of the two methods, a blended learning approach may allow students to be more interested and engaged in the learning environment, which combines the convenience of an online platform and interpersonal interaction in a face-to-face environment (Chen & Jones, 2007), and may bring the solutions to the problems mentioned previously.

To examine the impact of a blended learning approach on students' vocabulary learning, vocabulary knowledge retention and its feasibility, a number of methods were applied to obtain data in the current study to address the research questions. In an empirical study, experimental design, defined as "the design, which includes laboratory experiments and field trials, represents the evaluation of a manipulated intervention where at least one randomly allocated sub-group receives the treatment and at least one does not" (Gorard, 2013, p. xiii). Furthermore, an intervention group and a control group were required for the experimental setting – to investigate the results and understand causal inferences derived from the treatment and to compare the differences in the groups' test subjects. However, in a situation where random sampling is impracticable, for example, where the population is very small or there is an established group which cannot be selected by a systematic sampling method (Gorard, 2013), a quasi-experimental design provides an alternative. This is where the treatment or intervention is evaluated in the settings where randomisation is not possible to create groups for the experiment (Cohen, Manion, & Morrison, 2018; Creswell, 2012, 2014; Fraenkel, Wallen, & Hyun, 2012; Gorard, 2013; Price,

Jhangiani, & Chiang, 2015). The groups are selected and may not be equivalent, possibly also resulting in bias which provides a threat to the overall validity of the experiment. (Price et al., 2015; Trochim, 2006).

Educators commonly use intact classes or groups which are arranged in educational institutions (Creswell, 2012). Compared to true experiments there are threats to internal validity resulting from the allocation of students to classes and any pre-existing differences or influences in the groups are present in the experiment. This limits generalisability and any conclusions which rely on valid causal inferences from the design (Cook & Campbell, 1986; Fraenkel et al., 2012; Phakiti, 2014; "Research Ready: Quasi-Experimental Research," n.d.; Thomas, 2009). However, despite the lack of random assignment, a quasi-experimental design is feasible in terms of time constraints for random selection and uses intact groups of participants which are often easier to manage in an institutional environment (Creswell, 2014; "Research Ready: Quasi-Experimental Research," n.d.). In addition, it not only reduces any concerns about the subjects' pre-selection process, it also creates a more realistic situation and can identify some useful insights in terms of a causal relationship as well as exploring the feasibility of a particular approach (Bryman, 2016; Cook & Campbell, 1986; Phakiti, 2014; "Research Ready: Quasi-Experimental Research," n.d.). To strengthen this type of research, threats to validity should be addressed in order to minimise their impact on the study, and setting up an appropriate comparison group can also assist in terms of drawing wider inferences (Creswell, 2012; Dane, 2018; Drummond & Murphy-Reyes, 2018; Scher, Kisker, & Dynarski, 2015).

In previous studies regarding the investigation of the blended learning approach, quasi-experiments have been widely conducted in various academic subjects. Related to this research, the following examples of research in Table 3.1 employed quasi-experimental designs to study the effects of the blended learning approach towards English vocabulary learning.

Table 3.1 Quasi-experimental studies related to blended learning

Authors	Aims	Sample	Design	Evaluation tools	Analyses
Vasbieva, Klimova, Agibalova, Karzhanova, and Bírová (2016)	to study the effects of a blended learning approach on students' academic achievement and vocabulary knowledge	22 students from International Finance Department	One group pre-test-post-test	<ul style="list-style-type: none"> • pre-test • post-test 	<ul style="list-style-type: none"> • <i>t</i>-test • Sandler's A-test
Zhang et al. (2016)	to investigate the effects of vocabulary teaching in a flipped classroom	64 English-major students from class A and class B	Post-tests only non-randomised control-group	<ul style="list-style-type: none"> • two post-tests • interview 	<ul style="list-style-type: none"> • Descriptive statistics
Sun (2016)	to study the effectiveness of the flipped classroom model on students' vocabulary knowledge	two classes of Engineering Science students	Post-tests only non-randomised control-group	<ul style="list-style-type: none"> • post-test • follow-up test 	<ul style="list-style-type: none"> • Descriptive statistics
Tosun (2015)	to explore the effects of a blended learning strategy in teaching vocabulary and learners' perceptions of a blended learning approach in vocabulary learning	two intact classes of 40 intermediate level students	Pre-test-Post-test non-randomised control-group	<ul style="list-style-type: none"> • pre-test • post-test • interview 	<ul style="list-style-type: none"> • Independent sample <i>t</i>-test • Mean • S.D.
Majid, Stapa, and Keong (2015)	to study ESL students' perceptions of the use of blended scaffolding strategies through Facebook for learning and writing process and writing skill improvement	45 ESL students assigned to each experimental and control group	Pre-test-Post-test non-randomised control-group	<ul style="list-style-type: none"> • pre writing test • post writing test • essays • interviews 	<ul style="list-style-type: none"> • Mean • S.D. • content analysis
Jung and Lee (2013)	to examine the effects of using video clips on students' vocabulary development through listening in blended learning	26 university students in the non-credit extensive English program	One group pre-test-post-test	<ul style="list-style-type: none"> • pre-test • post-test • reflective journals • observations • questionnaire • interviews 	<ul style="list-style-type: none"> • paired <i>t</i>-test • Pearson's coefficient • Mean • S.D.
Djiwandono (2013)	to examine the effectiveness of a blended learning approach in promoting intentional vocabulary learning	One vocabulary class of 21 students	One group pre-test-post-test	<ul style="list-style-type: none"> • word level pre-test • midterm test • word level post-test • new word post-test • questionnaire 	<ul style="list-style-type: none"> • ANOVA • Mean • S.D.

From the examples of previous quasi-experimental studies in Table 3.1, the researchers conducted them at educational institutions where random assignment was impracticable and instead used intact classes based on

students' typical enrolment. Furthermore, these studies investigated the effects or effectiveness of the approach for the benefits of students' learning in specific contexts. Therefore, to enhance research validity to their work, participants in many of these studies were assigned to a control group for comparison (Majid et al., 2015; Sun, 2016; Tosun, 2015; Zhang et al., 2016). Djiwandono (2013), Jung and Lee (2013) and Vasbieva, Klimova, Agibalova, Karzhanova, and Bírová (2016) employed a single-group design, without a comparison group and looked at the variation from pre-test to post-test. However, unlike the other studies, Djiwandono (2013) analysed the threats to validity in his study and explored possible influences on the students' learning results, such as "course load during the final exam, unequal test difficulties, or a lack of repeated practice for the new words" (p.217). Hence, although a clear conclusion may not be drawn, instead additional explanations can be explored which might create potential threats to validity and their influence during the study considered (Price et al., 2015; Thomas, 2009), such as students' prior experience, testing, maturation, instrumentation or the attitudes of subjects (Cohen, Manion, & Morrison, 2007; Cohen et al., 2018; Fraenkel et al., 2012).

With respect to this study, as mentioned in Chapter 1 that in Thailand English language is not used as the official language, but is used widely at educational institutions, workplace and in work-related contexts. Therefore, in this research, "English for Industrial Management" course was selected for use in the experiment because of its relevant content and context. The sample was specified among the population of students, at a university in Bangkok, Thailand, who are majoring in science and technology and whose English proficiency tends to be at a moderate level, scored between 20-30 out of 60 (see the results chapter). In their study program, they are required to complete four English courses, which means that most of the other courses are relevant to the subjects of their major. This would also allow them to take a limited number of English courses during their four years of study, which might also affect their opportunities to learn, practice or use the language.

At the fieldwork site, random assignment was difficult because when students registered on an English course, they were allocated into classes based on their major. Consequently, individuals from these intact classes could not be rearranged or assigned into an intervention or control group as conducted in true experimental research. Therefore, to cope with the limitation, a quasi-experiment was selected to use for the data collection. Based on quasi-experiments, designs vary (Cohen et al., 2018; Price et al., 2015), and there are different forms to conduct the study. In the first place, the ‘non-equivalent control group pre-test - post-test design’ (Figure 3.2), which is frequently used in educational research (Cohen et al., 2007), was likely to be practical and its feasibility explored.

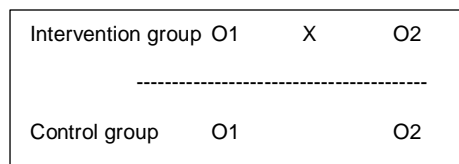


Figure 3.2 Non-equivalent Control Group Pre-test - Post-test Design

From Figure 3.2, basically, the ‘non-equivalent group’ refers to forming an experimental group and a control group that are not selected through random assignment because despite randomization, it might not ensure the similarity between the comparison groups (Trochim, 2006). Hence, related to this concern about non-equivalence, the test groups might be selected from samples that share similarities, e.g. from the same setting or population (Cohen et al., 2018). Furthermore, this design attempts to use a comparison or control group, as in true experiments, to avoid ambiguous interpretations and to focus on the change from pre-test to post-test (Creswell, 2012).

The model as presented in Figure 3.3, is called “Pre-test - Post-test non-randomised control-group design”, is suggested by Phakiti (2014), to randomly assign the treatment to the intact groups and take account of any pre-existing differences between the study groups in the analysis, in order to increase validity to the research. Moreover, as knowledge retention was one of dependent variables in this study, a delayed post-test was added to the model to follow up the sample’s retention of vocabulary knowledge.

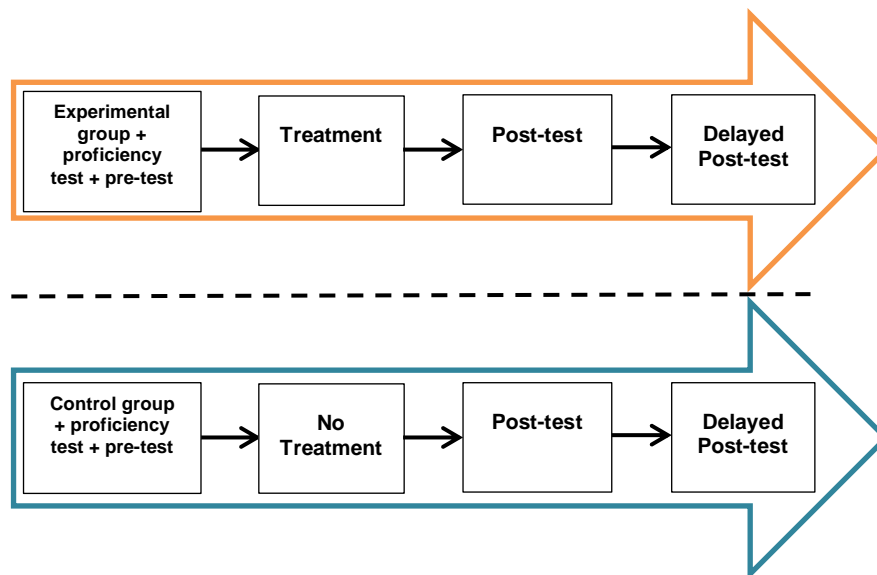


Figure 3.3 Pre-test - Post-test non-randomised control-group design

However, when making causal inferences to the results, potential threats to validity in this study might be drawn from any events (history) which affected the intervention and comparison groups differently during the experiment -- the time from the pre-test to post-test, such as students' work loads, mental fatigue, exams, attitudes of the subject or additional use of technology use in the classroom in the control group. In terms of generalisability, this research might not be generalised to the whole population, but can be explored along with other studies which share the similar characteristics and settings. Within the limitations of quasi-experimental designs, some suggested additions to this design are conducted by researchers to strengthen their study design. Firstly, prior to assigning the groups into the experimental or control condition, a 'matching' technique can be used to select the test subjects based on criteria such as age, gender, or years of study (Cohen et al., 2007, 2018; "Research Ready: Quasi-Experimental Research," n.d.; Scher et al., 2015) However, in a situation where there is an extensive difference between the intact groups, in terms of their mean scores, matching might not be plausible (Campbell & Standley, 1963). As an alternative, the study groups can be demographically selected by a convenient approach which allows them to share similar characteristics and settings (Cohen et al., 2007, 2018; Drummond & Murphy-Reyes, 2018; Price et al., 2015; "Research Ready: Quasi-Experimental Research," n.d.). Additional techniques can be used in the analysis, Phakiti (2014) suggested

administering the pre-test to intervention and control groups to examine any pre-existing differences between them, and in case the difference, e.g. pre-test means, still exists, ANCOVA (analysis of covariance) is recommended using the pre-test scores as the covariate. The sample used in this research was four intact classes registered on the selected course -- three classes (two classes of 3rd and 4th year engineering major students, and one class of 2nd year architecture major students) were assigned for intervention, and with one control group (4th year engineering major students). Regarding the suggested techniques above, the matching technique was not practical as they contained different characteristics, such as age, years of study, majors, GPA or language proficiency scores. Therefore, an English Proficiency test and a vocabulary pre-test were administered at the beginning to identify any pre-existing differences between them so that in the statistical analysis this can be taken into account.

3.1.1 The research setting

Established from the significant cooperation between the Thai Government and the Federal Republic of Germany in 1959, the university was originally known as “Thai-German Technical School” prior to being upgraded to Technical College in 1964. In 1986, it was changed from Technical College to “Institute of Technology” to support science and technology education and development, research, and academic services. In 2007, the institute obtained the full status of an autonomous state university. Furthermore, to extend the university’s educational obligations to the rural areas, two campuses were established in two different provinces, in 1995 and 2010, respectively. Since 1974, Faculties, colleges, institutes and organisational units have been founded to serve the development and educational expansion purposes. At present, the university consists of eight faculties, one international college, one international graduate school of engineering, one graduate school, one vocational college, and over six organisational units, mainly providing educational degrees and certificate courses in science and technology and others in arts and business management.

To develop and improve students’ English language skills and proficiency, the Faculty of Applied Arts, Department of Languages, was founded to

offer English courses for all students at the university. In one course, a class lasts three hours on a weekly basis over 15 weeks in one semester. According to the bachelor's degree curricula, English courses comprise three types: compulsory language courses, elective English for Academic Purposes (EAP) courses, and elective English for Specific Purposes (ESP) courses. Firstly, the compulsory language courses, designed to develop their integrated skills of the English language, consist of English I and English II for the four-year undergraduates, and Practical English I and II for the two-year undergraduates. Secondly, the elective EAP courses, such as English for Study Skills, Reading I/II, Writing I/II, and English Conversation I/II, have the objective for students of using the language in an academic setting appropriately. Finally, the elective ESP courses aim at the ability to use the language properly in specific contexts, e.g. the workplace, organisations, or industries. The courses are English for Tourism and Industry, English for Work, English for Industrial Management, and English for Scientists.

Normally, commercial course books are used, including extra handouts, audio and video materials, and online supplementary exercises for out-of-class practice or self-study. Moreover, regarding the course evaluation, criteria generally include in-class tasks, assignments, midterm and final exams, with varied percentage based on the course objectives and descriptions. It is a requirement for all students to complete their undergraduate programme by passing two compulsory language courses and two other elective courses selected from EAP or ESP categories. Within those three types of English courses, the four skills (listening, speaking, reading, and writing) aim to develop satisfactory level of language proficiency. Hence, vocabulary learning and development play an important and fundamental part in the lessons. Proficient vocabulary use is likely to be a foundation in both receptive and productive skills to learn and acquire the language (Barcroft, 2004; Hógain, 2012; Nation, 2001; Schmitt, 2010; Shabani et al., 2014)

3.1.2 The research design

As mentioned earlier, the fieldwork site of the current study took place at a university in Bangkok, Thailand, comprising academic majors related to science and technology. Through the journey of data collection, this study is divided into three phases: pre-pilot, pilot and main feasibility study. The pre-pilot stage was implemented prior to the pilot to perceive teachers' and students' readiness and awareness of the subject matter and technology-mediated learning (Tucker et al., 2017). In other words, it is important to identify the learning needs and consider using various learning or teaching methods creatively in order to fit those learning requirements (Thorne, 2003). Furthermore, needs analysis is recommended to be conducted prior to developing a blended learning course in order to explore how to select online tools to be integrated into the course effectively (Tosun, 2015). Therefore, in the pre-pilot phase, two different questionnaires were constructed to distribute to a sample of students, from their second to fourth year of study, and English language instructors. The purpose of the pre-pilot was to gain relevant information to their opinions and needs in English language learning and teaching, attitudes towards traditional and online methods, learners' characteristics, readiness, and expectations towards the blended learning environment. The data obtained from this phase were used to provide guidance in designing a blended learning course, which was then trialled in the pilot phase.

To prepare for the pilot study, a blended learning lesson, with the flipped classroom method, was designed and research tools (English proficiency test, vocabulary test, a questionnaire and interview questions) were constructed. They were subsequently trialled with a sample of students who enrolled in English for Industrial Management course, in order that the research tools and the sample of the lesson would be explored in the setting that was as similar to the main study as possible. Apart from examining validity of the tools, the pilot phase was carried out to identify any points for improvement and preparation prior to the main study. In the following term time, the main study was conducted in a quasi-experiment in the same course, English for Industrial Management. Here random

assignment into control and experimental groups was not possible due to the university's systematic allocation of students into the specified registered classes. Moreover, intact classes or groups are generally arranged by educational institutions, and are commonly used in quasi-experiments (Creswell, 2012). Consequently, a particular class was randomly assigned to be the control group, while the three others were organised as the experimental groups. To enhance the research validity, a "Pre-test - Post-test non-randomised control-group" design was used to examine pre-existing language knowledge between the two groups at the beginning (Phakiti, 2014). As a result, all participants took an English language proficiency test and a vocabulary pre-test in the first week of the course. In the following weeks, students were exposed to the blended learning environment in the flipped classroom instruction condition. After the lessons were taught, a vocabulary post-test was administered to examine the participants' increasing vocabulary knowledge. Furthermore, one month after the course ended, the participants were invited to take a further test to investigate their vocabulary knowledge retention.

3.1.3 The researcher's positioning

Having worked in education since 2002, I hold the view that technology is an important tool and has played an increasing part being integrated into (English language) instruction. Moreover, students have become acquainted with using technology, such as social networking, online platforms, or mobile applications, to support their life in informal and educational contexts. Teaching at the university for over 15 years, I have observed that although online learning materials have been widely introduced to students to undertake independently, Thai students in EFL contexts appear to encounter some difficulties to become autonomous learners. I am aware that teacher guidance and facilitation are still crucial to them both inside and outside the classroom. With respect to such change and situation, online platforms for education and social networking sites have been generally adopted to assist students' learning acquisition and to manage academic courses.

In this study, I took the dual role of researcher and teacher, or a “researcher-teacher” who myself was teaching in classes in order to conduct my research (Tabach, 2006). I am aware of the dilemma which may exist because of a single person conducting research and teaching. However, I attempted to separate and balance between the roles before, during, and after the conduct of this research. Before the commencement of the data collection, I considered the potential learning setting and prepared materials from the researcher’s point of view. In the teaching role, with the permission and cooperation from the Language Department at the university where I work, I provided the lessons to four classes and managed the English course, which I had to be concerned about the aspects of practicality, learners’ needs and classroom instruction. At the induction week, I organised an introduction to the course and also announced the purpose of the research to the students that the gathered data did not affect their evaluation in this course, and their scores and grades were not affected by the data collection.

With respect to the role in designing and implementing the blended learning approach, the lessons and pedagogical approach were originally arranged and considered based on the course description, course objectives, the university facility and infrastructure. Moreover, the lesson plan was then prepared and adapted from the teacher’s manual or resources of the selected coursebook. In blended learning classes, I applied the flipped classroom model which consists of before-class and in-class sessions where technology, such as free online platforms for education, social networking applications, and online game activity generator, was mainly mediated into self-study assignments and classroom instruction and practice. In the traditional classroom, I managed the control group in a conventional way which mostly relied on in-class practice and paper-based activities and quizzes. Inevitably, some technology was involved, for example, PowerPoint slides and after-class contact with the teacher through the use of a social networking application. During the process of preparing the lessons and course materials, I put myself in the perspective of teacher and student in the instructional context, and consulted my supervisor and

colleagues, English language instructors, to examine the lesson plan before it was trialled. I attempted not to take the role of researcher in designing and implementing the approach in order not to influence the experiment.

Regarding implementing the blended learning approach in during instruction, I always informed learning objectives to students at the beginning of each lesson. During the instruction, I am aware of the distance which can occur between instructor and students; therefore, I sought to alleviate such an issue by attempting to create good rapport and their engagement in activity with active learning tasks, group work, and friendly communication. I attempted to follow the instructional lesson plan and to avoid biases and presuppositions in how to lead the intervention to expected results or outcomes. During the term time, in each class, I also observed students' learning attention, or participation for qualitative data collection. The observation journal (See available sample of researcher observation notes at Appendix 12) was noted, from teacher's perspective, to reflect what I taught, occurrence during class time, and students' responses or behaviours before the data were then explored and interpreted based on the researcher reflections. At the end of the course, interview was conducted to gather additional qualitative data. I organised the interviews at a casual venue, asked them open-ended questions, and allowed them to be as open as they wanted to obtain their honest responses regarding the blended learning course.

3.1.4 Ethical considerations

Prior to the data collection of all phases of the research, ethics approval was sought and granted from the departmental ethics board. At the fieldwork site, participants were informed about the purposes of the study and their informed consent were sought to voluntarily take part in this research. At the beginning of the course, tests (English proficiency test and vocabulary pre-test) were distributed to both control and experimental groups and these tests were a part of this research only. From the second week, participants in the control group were taught in the traditional instruction, while the blended learning was conducted to those in the experimental group. Moreover, both groups' instruction was observed by

the researcher to look at their participation and behaviour. It was originally planned to use video-recording as an additional way to collect the data. However, students did not feel comfortable with the method, their consent was then not received. Consequently, to allow the learning atmosphere to be as natural as possible, video-recording was not employed and observations were finally conducted through note-taking. Their participation in this main study took approximately three hours per week, 16 weeks in total. In this study treatment given to the participants in the traditional teaching setting and the blended learning environment did not affect the academic core curriculum, course description and content. Likewise, test scores derived from this research did not also impact the students' evaluation or other scores related to this academic course. Moreover, during the weeks of instruction, two English language teachers from the Department of Languages were invited and asked for consent to take part in an independent teacher observation. Note-taking and audio-recording were used to collect the data from their observation and interview which consisted of their feedback and opinions towards the blended learning environment and its practicality. During the last week of the course, participants in this experimental design were invited to answer questions in a questionnaire, and participated in an interview which was collected through a voice-recording on smartphone and note-taking. The questions are related to their vocabulary learning, opinions towards feedback and feasibility towards blended learning instruction.

In terms of data protection, all the data gathered was treated confidentially and participants' data was anonymised. All data stored electronically was secured and abide by the Data Protection Act. Throughout the study conscious efforts were made to maintain confidentiality. All information provided by participants was used only for the research and was securely stored to ensure privacy for all participants. All responses given by the participants or other data collected were kept confidential. The records of this study were electronically kept secure and private. All files containing any information from the participants are password protected. In any research report that may be published, no information was included that

made it possible to identify students individually. There was no way to connect their name to their responses at any time during or after the study.

In the following sections of the methodology chapter, the discussion of methods is presented in two main following phases: preliminary research phases and the main study. Furthermore, the details of these sections are explained and discussed regarding research design, instruments, sample, and data analysis. In the next section of preliminary research phase, the procedural steps and results from the pre-pilot and pilot study are also described in detail.

3.1.5 Rationale of the methodological approach

Riazi and Candlin (2014) claimed that mixed-methods research, which combines quantitative and qualitative approaches, “is growing and proving valuable for a wide range of researchers in a variety of academic disciplines” (p.139) and probably has potential to investigate their research questions more precisely. In terms of language learning experiments, Phakiti (2014) defined quantitative research that “seeks to determine a relationship between two or more variables, related to numerical, measurement and statistical data analysis” (p.8), and described qualitative research as providing “importance to the uniqueness of the nature of language learning by an individual or group in a specific situation and context, which allows researchers to understand their research area meaningfully” (p.8). Johnson and Onwuegbuzie (2004) pinpointed that “The goal of mixed methods research is not to replace either of these approaches but rather to draw from the strengths and minimise the weaknesses of both in single research studies and across studies” (pp.14-15). It is likely that mixed methods can explore multiple perspectives of a studied phenomenon or findings, which may increase the plausibility and practicality of research (Creswell & Clark, 2018; Poth & Onwuegbuzie, 2015). To constitute the insights into the social and educational world, mixed methods research adopts pragmatism which provides sensibility and practicality to answer research purposes and questions (Clarke & Visser, 2018; Cohen et al., 2018; Giddings, 2006; Onwuegbuzie & Leech, 2005), by integrating and utilising the advantages of both quantitative and qualitative methods in a

single study (Gray, 2018). Additionally, Dörnyei (2007) stated that the integration of the two methods underlies a “pragmatist position” (p.30) which benefits the research contexts where they can provide the insights into interpretations of their respective findings. The underpinning principle of pragmatism is pertinent to research that takes experience, action, prediction and problem-solving into consideration (Cohen et al., 2018; Johnson & Onwuegbuzie, 2004). A pragmatic approach is adopted in a number of mixed-methods research approaches which integrate both methods in terms of relevant aspects of the study, in order to meet the research purposes and questions (Gorard, 2012; Onwuegbuzie & Leech, 2005). The pragmatic position is also claimed to be able to rigorously understand the meaning of findings by verifying aspects of the study based on empirical and descriptive precision (Onwuegbuzie, 2003; Onwuegbuzie & Leech, 2005).

In order to explore the potential of blended learning in EFL classrooms in a particular setting at a university in Thailand, this research was conducted using a mixed methods inquiry, comprising three phases of study: pre-pilot, pilot and main study. The pre-pilot phase employed a preliminary survey of students and English language faculty members in vocabulary learning and teaching, technology use, including needs and attitudes regarding face-to-face, online and blended learning. The pre-pilot also helped extract the information about how students and teachers viewed the importance of vocabulary learning, the frequency and purposes of their use of computers, including attitudes and readiness towards those learning environments. More importantly, this information supported the selection of the study design, the research tools and the research preparation for the course. Prior to the main study, a pilot phase was conducted to trial the tools and practicalities of using blended learning. The pilot phase provided the prospect of the practicalities of the blended learning lesson, and evaluation and administration of research tools. After the pilot study, the course materials and instruments were improved and prepared for the final phase. In the main study, the feasibility of the blended learning approach on vocabulary learning and vocabulary knowledge retention, and an evaluation of participants' opinions were assessed through a quasi-experimental

design. To answer the research questions, both quantitative and qualitative approaches were used in the design process by adopting a quasi-experimental design which enabled a rigorous evaluation of the value and feasibility of blended learning. Quantitative methods were used to investigate participants' vocabulary knowledge, knowledge retention, attitudes and perceptions on the blended learning approach. The quantitative approach helped to guard against researcher and informant bias in assessing the impact of the approach on the vocabulary learning of the research participants. Alongside the quantitative research, qualitative approaches were employed to interpret and support the quantitative findings regarding the participants' attitudes and perceptions in exploring the feasibility of the approach.

With the quasi-experimental design used in this study, the concepts of validity and reliability are also important aspects in relation to the design and selection of instruments (Fraenkel et al., 2012). Validity is needed in order to be certain that the use of instruments and measures is as appropriate as possible in relation to the goals of the study (Cohen et al., 2018). It consists of two types: internal validity, which relates to what is conducted in the experiment of the study and any impact on the participants. While external validity in research concerns a generalisation to different settings or participants (Phakiti, 2014). As this study was not able to select participants randomly from the population of possible students, any claim to external validity is limited and was not an aim of this project. Fraenkel et al. (2012) explained that reliability represents "the consistency of scores or answers from one administration of an instrument to another, and from one set of items to another" (p.147), which might be affected by variations in "motivation, energy, anxiety, and a different testing situation" (pp.154-155). As the sample described in this chapter, participants from intact classes were used as the sample in this study. Consequently, threats to internal validity of selection, lack of randomisation and non-equivalence between the comparison groups occurred in employing the quasi-experimental design, which can lead to limits of generalisability and drawing conclusions of causal inferences to other population (Cook & Campbell,

1986; Fraenkel et al., 2012; Phakiti, 2014; "Research Ready: Quasi-Experimental Research," n.d.; Thomas, 2009). Nevertheless, in terms of process of data collection, the design reduced time constraints in the sample's random selection, by using the intact groups which could eliminate difficulties in management at the fieldwork (Creswell, 2014; "Research Ready: Quasi-Experimental Research," n.d.). Furthermore, as this study is looking at the feasibility, the research design favoured the investigation because it established a realistic and natural setting which can provide some benefits for the insights and educational value (Bryman, 2016; Cook & Campbell, 1986; Phakiti, 2014; "Research Ready: Quasi-Experimental Research," n.d.) in relation to the change and the extent of how feasible blended learning instruction is in EFL classrooms. To strengthen the research design and ensure appropriate validity and reliability in this study, first, a control group was set up to be a comparison to the experimental group, as conducted in true experiments (Scher et al., 2015), and threats to validity which may have the impact on the study have been identified (Creswell, 2012; Dane, 2018; Drummond & Murphy-Reyes, 2018; Scher et al., 2015). Moreover, the vocabulary pre-test was used to indicate pre-existing difference between the test groups, and particular statistics, as ANCOVA, was conducted to compare between the non-equivalent groups (Phakiti, 2014). Second, not only were all instruments constructed based on specifications and adopted from trusted researchers, but also they were examined by supervisor and experienced English language teachers. Moreover, after the instruments were piloted by rating and scoring procedures, the validity and reliability of measurements in questionnaire and tests are reported in this chapter.

3.2 Preliminary research phases

To begin this study, two preliminary research phases were conducted prior to the main study. In order to assist in designing a meaningful Blended Learning (BL) lesson and to understand learners' or teachers' needs, a *pre-pilot study* was firstly carried out at a university in Bangkok, Thailand by constructing a pre-course survey to explore students' and instructors' views on vocabulary learning, computer use, attitudes towards face-to-face and

online learning approaches, and expectations in the blended learning environment. In the phase of *pilot study*, research tools used in the study, such as tests, a lesson plan, a questionnaire and interviews, were trialled in order to make improvements and to explore validity and reliability for the main study. In this phase, students at the university participated in the instruction, took the tests, responded to the questionnaire, and took part in the interviews. The results derived from this pilot study were analysed and used in adjusting the lesson plans and materials employed in the main experimental study. The information and discussion from the phases of pre-pilot and pilot study are presented in the following sections (3.2.1 and 3.2.2).

3.2.1 Pre-pilot study

In this pre-pilot phase, pre-course surveys were conducted online and distributed to English language instructors and students who studied or were studying English courses at the university. These surveys aimed to obtain information, such as learning or teaching needs, characteristics, readiness, or expectations, which were extracted and used as guidance for a blended learning design in this research.

3.2.1.1 Participants

The sample used during the pre-course survey consisted of 124 students and 18 English language instructors. Attempting to use a sample who shared similar characteristics to the main study, the participants varied from 2nd to 4th year of study, and were from different faculties, such as Engineering, Applied Science, Architecture and Design, and Industrial Technology and Management. They have learnt English for 10-15 years and have taken at least a few English courses at the university. Furthermore, during this pre-pilot data collection, they were taking English for Specific Purpose (ESP) courses, such as English for Industrial Management or English for Work. The English language instructors have had over ten years of teaching experience, and basically taught foundation English courses and other ESP courses.

3.2.1.2 Instruments

Regarding the research instruments used in this pre-pilot study, two sets of 65-item online questionnaires were constructed and adapted from earlier

research (Hoernke, 2016; Tang & Chaw, 2013; University of York, 2011), one for the students and another for the instructors. In each questionnaire, four dimensions were constructed to generate the question items, as shown in Table 3.2.

Table 3.2 Dimensions of the questionnaire items

		Students	Instructors
Dimensions	1	The importance of vocabulary learning	
	2	Access to computer use and the Internet	
	3	Attitudes towards face-to-face and online learning	
	4	Expectations towards the blended learning environment	

3.2.1.3 Results from the pre-course survey

After conducting the online survey, regarding the five rating scales used in this survey, the results were analysed by descriptive statistics (mean and standard deviations) and to interpret the data. The results are also presented based on the dimensions indicated in Table 3.2.

1) Opinions on the importance of vocabulary learning

As illustrated in Figure 3.4, based on the opinions ranked in the “Strongly agree” level, students’ opinions (items 1, 2 and 8) and instructors’ opinions (items 1, 2 and 3) revealed that they realised the importance of English vocabulary learning and teaching as they play the important part of academic study and future career. Furthermore, students viewed that review and practice were necessary for vocabulary learning and knowledge retention. However, from their views, forgetting vocabulary that was previously learnt could happen at any time after the course, and they occasionally had difficulties retrieving the vocabulary they learnt in previous English courses.

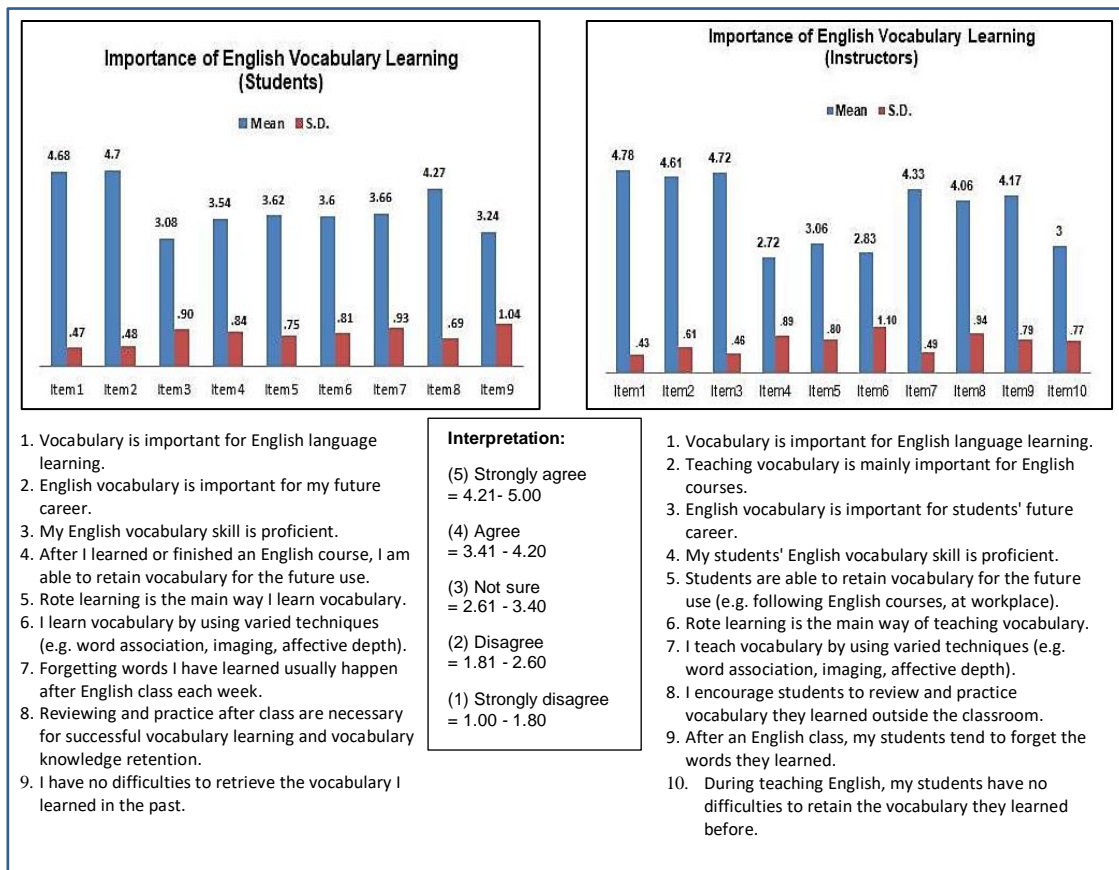


Figure 3.4 Opinions on the importance of vocabulary learning/ teaching

2) Access to computer use and the Internet

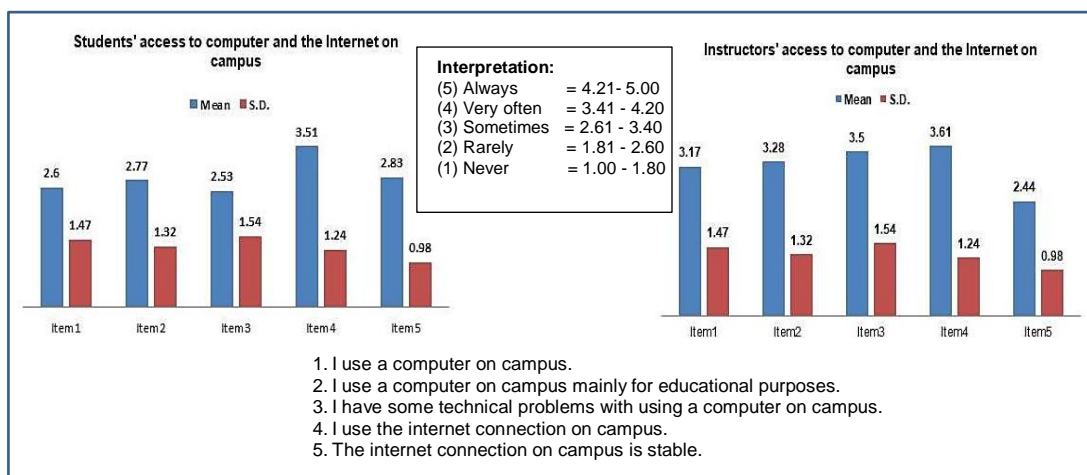


Figure 3.5 Frequency of access to computer use and the Internet

Figure 3.5 and Figure 3.6 indicate the frequency of students' and instructors' computer and internet use, and their computer use at home. According to Figure 3.5, students' and instructors' responses (items 1 and 2) revealed that they sometimes used the computer facility and for academic purposes on campus. In terms of technical problems (item 3), students seemed to

have fewer difficulties of using a computer on campus than the instructors. Furthermore, both of them used the internet connection on campus very often (item 4). However, they found the connection to be occasionally unstable (item 5); therefore, from the open-ended suggestion, they would like this to be addressed in order to be more effective and ubiquitous on the university campus.

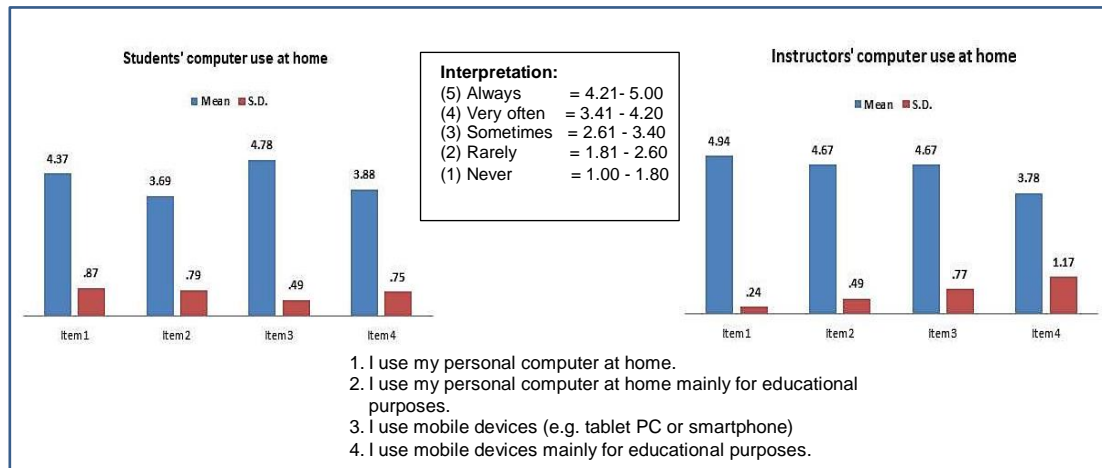


Figure 3.6 Frequency of computer use at home

In terms of computer use at home (Figure 3.6), students and instructors always used their personal computer and mobile devices, e.g. tablet or smartphone (items 1 and 3) and used them very often for educational purposes (items 2 and 4). From the survey, they used their own PC or mobile devices rather than on-campus computer facility, and the stable and effective internet connection seemed to be requested to serve their academic or other purposes.

Regarding their online activities, the results are presented with the five most frequent online activities that students and instructors did. Table 3.3 and Table 3.4 show that both students and instructors share the similar activities, at least at a very high level. That is, they always chatted online, sent instant messages, and searched for information. Based on the students' information and similar mean scores, it can be seen that they did those activities most frequently. It is probably related to their responses on using computer for educational purposes (in Figure 3.5) ($M = 3.69$, $SD = 0.79$) which was rated lower than the instructors' responses ($M = 4.67$, $SD = 0.48$).

Table 3.3 Students' online activities

Online activities (Students)	Mean	S.D.	Interpretation
Listen to streaming audio	4.56	0.70	Always
Chat online or send instant messages	4.55	0.66	Always
Social networking (e.g. Facebook, Twitter)	4.52	0.68	Always
Search for information	4.51	0.69	Always
Watch streaming videos	4.50	0.70	Always
Browse websites	4.27	0.90	Always

Table 3.4 Instructors' online activities

Online activities (Instructors)	Mean	S.D.	Interpretation
Send email	4.72	0.21	Always
Search for information	4.72	0.57	Always
Chat online or send instant messages	4.33	0.84	Always
Browse websites	4.11	0.83	Very often
Social networking (e.g. Facebook, Twitter)	4.00	1.23	Very often
Download files or applications	3.78	1.00	Very often

These results revealed that students and instructors used their PC or mobile devices to do online activities, such as browsing websites, online chat, sending messages, social networking and streaming audio and videos. Students seemed to do various online activities frequently, while instructors tended to send email and search for information most frequently. As can be seen, it may indicate that both of them are acquainted with and have very frequent use of technology to serve their general and educational purposes.

3) Attitudes towards face-to-face and online learning

With respect to this dimension, the results are presented for the three following aspects: online, face-to-face learning, and self-directedness. These aspects represent students' and instructors' attitudes towards the ideas related to online and face-to-face learning environment and self-directed learning. The following tables show the three highest responses of each aspect from students and instructors. From Table 3.5 and Table 3.6, regarding the aspect of online learning, the results revealed that both students and instructors realised the usefulness of web technologies as a

familiar means to share knowledge with others. The students viewed online learning and activities as opportunities for out-of-class practice and for interactive communication with their peers and instructors. In the same way, from the instructors' view, they realised the online method could be convenient for them to incorporate educational online platforms, such as online and web-based course management applications, into an English course, and for students to practice English after class as well as communicate with their students and colleagues.

Table 3.5 Students' the three highest responses for each aspect

Aspects	Statements	Mean	S.D.	Interpretation
Online learning	The Web is a useful platform for learning.	4.35	0.62	Strongly agree
	I feel comfortable using Web technologies to exchange knowledge with others.	4.25	0.68	Strongly agree
	Online communication with others is convenient to use.	4.13	0.68	Agree
Face-to-face learning	I would like to receive face-to-face feedback or guidance from my classmates and teacher.	4.05	0.73	Agree
	I feel comfortable with teacher-directed classroom-based activities.	3.99	0.73	Agree
	Learning through face-to-face collaboration is more effective.	3.81	0.84	Agree
Self-directedness	I expect my teacher to give me guidance for my study.	4.06	0.78	Agree
	I want to make my own decisions in organising my study time.	4.96	0.78	Strongly agree
	I want to make my own decisions where I want to study.	3.81	0.89	Agree

Table 3.6 Instructors' the three highest responses for each aspect

Aspects	Statements	Mean	S.D.	Interpretation
Online learning	The Web is a useful platform for learning.	4.67	0.48	Strongly agree
	I appreciate easy online access to my students.	4.44	0.61	Strongly agree
	Online communication with others (e.g. students, colleagues) is convenient to use.	4.28	0.75	Strongly agree
Face-to-face learning	Learning through face-to-face collaboration is more effective for students.	3.94	0.87	Agree
	I feel comfortable organising teacher-directed classroom-based activities.	3.94	0.87	Agree
	I would like to provide face-to-face feedback or guidance to my students.	3.89	0.75	Agree
Self-directedness	I want my students to organise their own learning plan.	4.56	0.51	Strongly agree
	Students should make their own decisions in organising their own study time.	4.28	0.66	Strongly agree
	I would like students to be exposed to self-directed learning.	4.28	0.61	Strongly agree

With respect to self-directedness, as the students viewed the online method as a possibility to organise their own study, this supported their attitudes

regarding self-directed learning in terms of their own decision-making in learning, places and time to study, and self-assessment, at a high level. Similarly, from the instructors' attitudes, self-directed learning was rated at the "strongly agree" level. It is considered very important for students because it takes part in decision-making and organising their own learning at their own pace and time.

In regard to aspect of the face-to-face learning, students viewed its importance at a high level, such as their feeling about teacher-directed instruction, peers' and teacher's feedback or guidance, and face-to-face collaboration. Similarly, instructors considered that face-to-face learning was also necessary as giving feedback via face-to-face collaboration would still be effective for students.

According to the results from these questions, face-to-face and online learning, they revealed that students and instructors perceived the potential of using technologies in their learning or teaching in terms of easy access to the course content or practice, interactive communication with peers and teachers, and incorporating learning management platforms into the course. At the same time, they also considered face-to-face interaction effective for collaboration, receiving or giving feedback, facilitations or guidance, which could lead to the results regarding the facilitation in an English language course in the next section.

4) Expectations towards a blended learning environment

In this dimension, the results are divided into the following four aspects: facilitation expected to receive from the teacher/ give to students, online activities to improve students' English vocabulary learning, digital tools or applications that suit students'/teachers' needs, and favourable proportions between face-to-face and online learning.

- **Facilitation**

In this aspect, the students were asked about facilitation they expected to receive from their teacher. At the same time, the instructors were required to express their opinions on facilitation they would like to give to their students. Regarding facilitation that students expected to receive from teacher, Table

3.7 shows the five highest percentages of the results which indicate that students were demanding their teacher assist them in terms of listening or speaking, necessary language skills for their future career, teaching effectiveness, vocabulary learning techniques, and English study skills.

Table 3.7 Facilitation expected to receive from teacher (Students' view)

Responses	Frequency (N = 124)	Percentage (%)
1. Listening/Speaking	20	16.12
2. Language use for the future career or contexts	14	11.29
3. Effective teaching methods	19	15.32
4. Vocabulary learning and memorising techniques	12	9.67
5. Study skills	12	9.67

Table 3.8 presents the results of instructors' facilitation expected to give to students in three kinds of responses. From their view, they were willing to facilitate their students in terms of giving them advice for their study or language learning (44.44%), encouraging them to be self-directed (33.33%), and giving additional assistance for the course content (22.22%).

Table 3.8 Facilitation expected to give to students (Instructors' view)

Responses	Frequency (N = 18)	Percentage (%)
1. Advice for their study or English language learning	8	44.44
2. Learner autonomy/Self-directed learning	6	33.33
3. Additional explanation for learning or class content	4	22.22

- Online activities to improve vocabulary learning

For this aspect, the aim was to explore students' and instructors' use of online activities to help improve vocabulary learning. The five highest percentages of their choices from the survey results are shown in Tables 3.9 and 3.10.

Table 3.9 Students' choices of online activities

Details	Frequency (N = 124)	Percentage (%)
1. Watching VDO clips, movies or dramas in English	88	14.1
2. Listening to English songs and learning vocabulary from the lyrics	77	12.3
3. Playing online games which are presented in English language	67	10.7
4. Taking English vocabulary tests on websites for vocabulary knowledge self-assessment	61	9.8
5. Reading news or articles online	57	9.1

The results from Table 3.9 revealed that most students selected watching videos, movies, or dramas in English language (14.1%) as assistance in their vocabulary learning, followed by learning English from the song lyrics (12.3%), playing online games (10.7%), taking tests on websites (9.8%), and reading articles or news online (9.1%).

Table 3.10 Instructors' choices of online activities

Details	Frequency (N = 18)	Percentage (%)
1. - Reading news or articles online - Watching VDO clips, movies or dramas in English	17	11.8
2. - Learning vocabulary by chatting online with the native speakers - Listening to English songs and learning vocabulary from the lyrics	14	9.7
3. - Using a program or software to help increase vocabulary knowledge retention - Playing online games which are presented in English language	13	9
4. - Taking English vocabulary tests on websites for vocabulary knowledge self-assessment - Consulting online dictionaries (e.g. Oxford, Cambridge, Macmillan) to learn the meaning of words	12	8.3
5. Online TOEIC/TOEFL/IELTS practice tests	11	7.6

Likewise, in Table 3.10, instructors shared similar choices, for example, most of them selected watching videos, movies, or dramas in English language and reading news online (11.8%) as the most effective way to improve vocabulary learning, followed by chatting online and listening to

English songs (9.7%), taking online vocabulary tests and consulting online dictionaries (8.3%), and taking online standardised tests (7.6%).

- Digital tools or applications

This section represents the selection of digital tools or applications that suit students' needs and learning styles and instructors' needs and teaching styles. From Table 3.11, it is shown that both of them mostly selected smartphones (Students = 26.9%, Instructors = 17.8%), followed by tablet PC (Students = 14.4%, Instructors = 16.4%). With respect to applications, the result reveals that social networking websites or applications (Students = 18.3%, Instructors = 20.5%) mainly suited their needs and learning/teaching preferences.

Table 3.11 Students' and instructors' use of digital tools or applications

Details	Students (N = 124)		Instructors (N = 18)	
	Frequency	Percentage (%)	Frequency	Percentage (%)
1) Smartphone	112	26.9	13	17.8
2) Tablet PC	60	14.4	12	16.4
3) Computer Laboratory	33	7.9	3	4.1
4) Social networking website or applications	76	18.3	15	20.5
5) Applications or Package for English language practice, created and researched by educational institutions or companies, or attached with commercial English coursebook	59	14.2	12	16.4
6) Learning Management System (LMS) websites or platforms for education (e.g. Moodle, Blackboard, Edmodo, Litmos, Google Classroom)	40	9.6	9	12.3
7) Websites or applications for file sharing (e.g. Dropbox, Google Drive, Box.net)	36	8.7	9	12.3

- Favourable proportions between face-to-face and online learning

Figure 3.7 reveals the preferences for face-to-face and online learning in the blended learning environment. The figure shows that both students and instructors prefer the same proportions of face-to-face (70%) and online (30%) learning. This may indicate that they considered one-to-one or face-

to-face interaction vital in teaching and learning, while technology is probably mediated into instruction, not mostly incorporated as the core of the course.

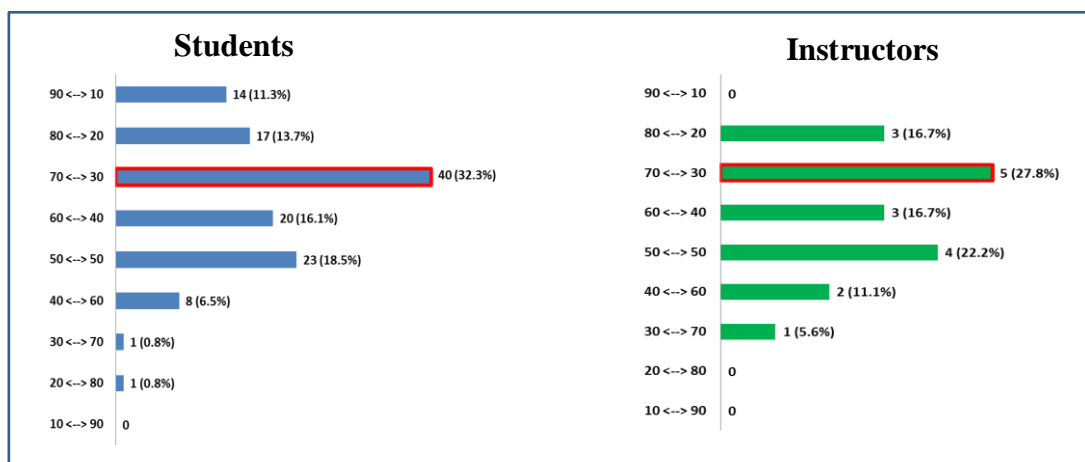


Figure 3.7 Students' and instructors' favourable proportions between face-to-face and online learning

3.2.1.4 Summary of the results from the pre-pilot study

In Table 3.12, the key results of students' and instructors' responses from this pre-pilot phase are summarised by being categorised into four dimensions.

Table 3.12 Summary of the key results from the pre-pilot phase

Dimensions	Summary of the results	
	Students	Instructors
The importance of vocabulary learning (and teaching)	<ul style="list-style-type: none"> • Very high level for the importance of vocabulary for language learning and their future career • Very high level for the importance of reviewing and practice after class for successful vocabulary learning and knowledge retention • They tended to forget vocabulary learnt in the previous lessons 	<ul style="list-style-type: none"> • Very high level for the importance of vocabulary for language learning and teaching for students' future career • Students tended to forget the words they learned. • Encouraging students to have out-of-class review and practice on vocabulary they learnt.
Access to computer use and the internet	<ul style="list-style-type: none"> • High frequency for using their own computer and mobile devices both at home and on campus • High frequency for using the internet connection on campus • Low frequency for using university's computer facilities • High demand for effective and ubiquitous internet connection on the university campus 	<ul style="list-style-type: none"> • High frequency of using email, online chat/ instant messages, and browsing websites
	<ul style="list-style-type: none"> • High frequency of using social networking, online chat/ instant messages, and watching streaming VDOs 	

Dimensions	Summary of the results	
	Students	Instructors
Attitudes towards face-to-face and online learning	<p>Face-to-face aspect:</p> <ul style="list-style-type: none"> • High level for the importance of f2f interaction in teacher-directed environment (e.g. teacher's feedback, guidance, collaboration in the classroom) <p>Online aspect:</p> <ul style="list-style-type: none"> • High level for the usefulness of web technologies, online learning and activities for out-of-class practice, and interaction with peers and teacher • The possibility of online learning to support them in organising their own study <p>Self-directedness:</p> <ul style="list-style-type: none"> • High level for the importance of self-directedness, e.g. making their own decisions in learning or self-assessment 	<p>Face-to-face aspect:</p> <ul style="list-style-type: none"> • High level for the importance of f2f interaction for collaboration, and giving feedback, facilitations and guidance <p>Online aspect:</p> <ul style="list-style-type: none"> • High level for the usefulness of web technologies to share knowledge with students and colleagues • High regard for incorporating educational platforms into courses and for students' out-of-class practice and communication <p>Self-directedness:</p> <ul style="list-style-type: none"> • High level for the importance of self-directedness for students' learning
Expectations towards the blended learning environment	<p>Facilitations from teacher:</p> <ul style="list-style-type: none"> • Listening and speaking skills • Necessary language skills for future career • Vocabulary learning techniques • English study skills 	<p>Facilitations to students:</p> <ul style="list-style-type: none"> • Advice for their study • Additional assistance for the course content • Support for self-directedness
	<p>Online activities to improve vocabulary learning:</p> <ul style="list-style-type: none"> • Watching VDO clips, movies or dramas in English <p>Tools that suits their needs and learning/ teaching styles:</p> <ul style="list-style-type: none"> • High selection for smartphone and social networking <p>Favourable proportions between face-to-face and online learning: Face-to-face = 70% : Online = 30%</p>	

From Table 3.12, the results reflected that, firstly, although students may be unable to retain their vocabulary knowledge for a long interval, vocabulary learning was still identified as an important skill in English language learning and for language use in a future career. Secondly, with accessibility and affordability of technological devices nowadays, both students and instructors tended to be acquainted with the use of technology to use their own computer and mobile devices for their own convenience, and demanded to use the powerful internet connection which would respond to their entertainment or educational purposes of online activities, such as watching streaming videos, social networking, or surfing through websites.

Moreover, in terms of their attitudes towards face-to-face and online learning, although they viewed web technologies and online tools as the important factor for learning, they still focused on self-directedness, which was crucial to their learning, and face-to-face interaction between peers or teachers who could provide them feedback, guidance or collaboration. This was also supported by the evidence of their preference for face-to-face (70%) compared with online learning (30%). Furthermore, in a learning environment, both realised that facilitation to each other still played an important role with respect to language study skills, giving advice, support for self-directedness and the language use for future career. Therefore, prospective blended learning lessons in the subsequent research phases of this study could be designed to encourage learners to be more self-directed and serve the learning aspects of more one-to-one and group interaction and practice with the effective use of technology mediation. Moreover, research tools, such as tests, a questionnaire and interviews, including the lessons, could be constructed, prepared and trialled in the following pilot study phase.

This pre-pilot study extracted useful information as guidance for the main study. It set out to examine the importance of vocabulary learning, technology use, and attitudes towards the blends of online and face-to-face methods, including self-directedness, from students' and instructors' perspectives. The findings indicated that students and instructors are aware of the importance of vocabulary in English language learning and the benefits of vocabulary for future use or other purposes. Furthermore, students and teachers possess their own computer and mobile devices. Consequently, they regularly connect to the internet and are acquainted with engaging technology in their everyday life, for entertainment, communication and educational purposes. In this respect, their attitudes towards the use of online technologies and self-study are likely to be positive. Therefore, with their acquaintance with and positive perceptions of technology, they would probably have less difficulty in coping with online assignments or activities independently. However, according to their preference for face-to-face teaching, it might imply their reliance on teacher

interaction where students still require facilitation and guidance from instructors. This is also in agreement with the teachers' perspectives, that face-to-face interaction is still important for students in terms of being able to give advice and assistance to encourage students to cope with online learning or self-study effectively. Hence, the findings emerged from the pre-pilot could provide some directions for the main study to manage the blended learning course and prepare materials and research tools for the instruction. Moreover, the pre-pilot study provides some understandings of students' own awareness of English vocabulary learning and self-directedness towards language learning, including the importance of a prospective role for the teacher in promoting students' learning in the blended learning environment.

3.2.2 Pilot study

After conducting the survey for the previous phrase, a pilot study was then conducted at the university, in January 2018. The decisions made for the instructional design in this phase were based on the results derived from the pre-pilot phase which indicated that, first, students realised the importance of vocabulary learning which could be of their interest and useful for their academic study and future career. Second, they tended to be positive and acquainted with an online learning environment where they seemed to have confidence and readiness to undertake online lesson on their own. However, they concurrently need practice and interactions with peers and teacher facilitation and guidance in the face-to-face or classroom setting. Therefore the flipped classroom model was selected to use for the lesson plan preparation as it is suitable for students to undertake online self-study outside the classroom and spend time practicing through in-class activities and tasks. Furthermore, in the course design, other important factors needed to be considered, such as course objectives, computer facilities, places, course materials, and preliminary evaluation. A sample lesson plan was prepared, and then was examined in terms of organisations, structures, and appropriateness of activities and assessment by the supervisor and an English language instructor, who has over ten years of teaching experience at the university. The main purpose of this part of the study was to trial the

research tools (English proficiency test, vocabulary test, lesson plans, questionnaire and interview questions) with a sample which possessed the similar characteristics to the prospective participants in the main study. This aimed to explore validity and identify any points for improvement.

3.2.2.1 Participants

In this pilot study, the sample was selected by a convenience sampling method, with the aim to adhere to a minimum sample size for a pilot study, of 25-30 (Phakiti, 2014). To trial the tests, approximately 300-360 participants were used during the pilot study who varied from second to fourth-year students, depending on each tool. Furthermore, for the lesson trial, 52 fourth-year students who took English for Industrial Management course, academic year 2/2017 participated in this phase.

3.2.2.2 Instruments

The following instruments were examined in preparation for the main study.

1) English proficiency test

Having been granted permission from Cambridge Assessment, this study uses the B1 Preliminary English Test (PET) sample paper (See Appendix 9), which is suitable for testing students at the university level. This test is different from the vocabulary pre-test and post-test as it is an English standardised test which was used to test their general language ability. However, students still needed a certain level of existing vocabulary knowledge to do the test. To score objectively, there were two sections selected to use for testing: listening and reading, which contained 60 items in total, in the cloze test and multiple-choice test forms. Further test specification of PET is available in Appendix 8. The actual purpose of using the test was to enhance the validity of the research by providing a pre-test of English proficiency at the beginning of the main study. However, in this pilot study phase, this test was trialled with 310 students from various departments, majoring in science and technology, from second to fourth year of study. This trial aimed to examine the test administration process and the practicality of using the test with students who shared the similar characteristics with the prospective participants in the main study. After the trial, the test scores were analysed and the results are shown in Figure 3.8.

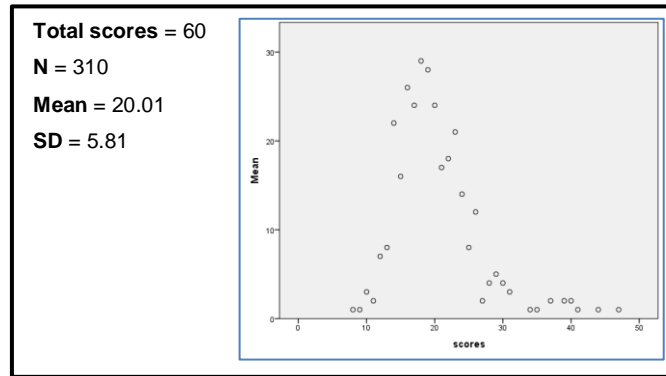


Figure 3.8 Scatter plot of the sample's PET scores

The scatter plot illustrates that most of the students scored approximately between 10 and 30, while fewer students scored roughly between 30 and 50. As can be seen, no students scored higher than 50, or gained a perfect score. Likewise, there were not any students who scored 0. It appears that most of the participants did not possess high English language proficiency. In terms of practicality of the test, the scatter plot shows a reasonable spread. This was expected as the test is a standardised test which is practical and appropriate to use the test as a research tool in the phase of main study.

2) Vocabulary test

The textbook "In Company 3.0" (Clarke, 2014) is used in the English for Industrial Management course. The vocabulary test was constructed based on the content from this coursebook. As there were 13 units taught in this course, this test contained 130 items (10 items for each unit) which were constructed in the multiple-choice form and allowed examinees to choose the correct meaning to each word. Further vocabulary test specifications are available in Appendix 8. Within the 10 items, three of them were other words which were not taught explicitly in the classroom. These untaught words were added in order to avoid the ceiling effect "where most students scored highly" (Cohen et al., 2018, p. 770) and to explore wider vocabulary knowledge. To assess the practicality of using this test, it was trialled with 362 students who were studying in the English for Industrial Management course the English for Work course, in semester 2 of the academic year 2017. To obtain the number of participants for this trial, the students who

registered for the English for Work course were selected as additional participants because this course also shared similar course settings and students who passed the required fundamental English courses as those in the English for Industrial Management course. After analysing the test scores, Figure 3.9 shows the scatter plot of students' vocabulary test scores, which indicated that most of the participants scored approximately between 20 and 60, while fewer students scored roughly from 60 to 85. It appears that a majority of the students did not gain high scores from this test. It may be that vocabulary test items were constructed by relying on the aforementioned coursebook, which these students had not learnt before. Consequently, their relevant background vocabulary knowledge to this test might be limited. However, in terms of practicality of this vocabulary test for the main study, although the spread is slightly right-skewed, there is a big difference between those who gained the lowest and highest scores, which means it is practical and appropriate to use in the subsequent phase of the study.

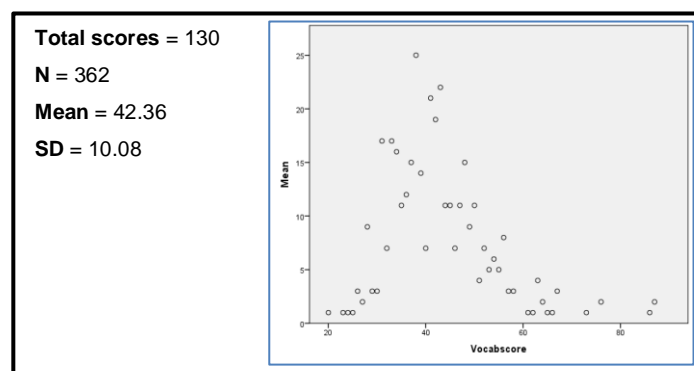


Figure 3.9 Scatter plot of the sample's vocabulary test scores

3) Questionnaire

The online questionnaire was employed in this study to obtain the sample's perceptions and attitudes towards blended learning instruction in the English course, which contained four dimensions: attitudes towards blended learning, perceptions towards blended learning, perceptions towards blended learning instruction during the course, and suggestions for the blended learning course (See Appendix 1). As presented in Figure 3.10, the process of constructing the questionnaire was started by specifying

research objectives, target sample or focus groups, and tentative measure or scales are necessary to be taken into consideration.

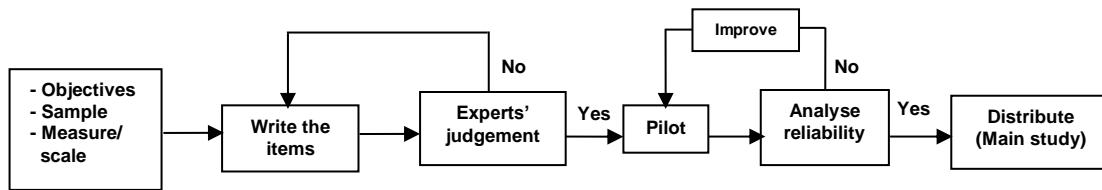


Figure 3.10 Flowchart of questionnaire construction

After constructing the questionnaire, it was examined not only by the supervisor, but also two invited English language instructors, at the University at the fieldwork site, who have over ten years of English language teaching and research experience. The questionnaire was then piloted to find the reliability to ensure the extent of its consistency of all items that what is measured will not change when it is used over again for the main study (Gray, 2018). Thereafter, the refined questionnaire items were employed in the main study.

The questionnaire was trialled through an online distribution. The respondents who took part in this survey were the participants from the lesson or teaching experimental trial. After the data from the questionnaire were analysed, firstly, based on the respondents' general information in Table 3.13, they were studying in their fourth year, with ages ranging from 21 to 24. Most of them have learned English for over 15 years and gained good computer skills, with moderate experience in online courses and blended learning.

Table 3.13 Respondents' personal information

Respondents (N = 17)	Details	Percentage (%)
Year of study	4	100
Age	21-24	100
Years of studying English	10-15 years	11.8
	> 15 years	76.5
Computer knowledge	Average	41.2
	Good	58.8
Experience with online courses	Somewhat	70.6
	Very little	23.5
	Not at all	5.9
Experience with blended learning	To a great extent	5.9
	Somewhat	70.6
	Very little	17.6
	Not at all	5.9

In terms of its scale item results, by using a reliability coefficient scale from 0.00 to 1.00, a score of 0.9 is considered acceptable (Cohen et al., 2018; Gray, 2018). As shown in Table 3.14, the spread of mean scores and reliability values were considered acceptable to be employed in the next research phase.

Table 3.14 Scale items results

Questionnaire	Mean	S.D.	Reliability (Cronbach's Alpha)
40 items	3.21	0.49	0.9

4) Semi-structured interview

To gain in-depth information on students' learning in the blended learning environment, interview questions, were constructed based on the study objectives, the subject matter, and respondents (See the sample questions in 3.3.4.5). The questions were set up and trialled during this phase to investigate the extent that the respondents were probably able to give the insight answers. To conduct the interview, four interviewees were randomly selected from the participants who took part in the lesson teaching trial. They were asked questions and their answers were stored on a recording device. Their opinions and answers from the interview could be useful to improve and prepare the blended learning course in the main study.

5) Lesson plan

As mentioned earlier that the coursebook was selected to use in the English course, the lesson plan was not newly designed but adapted from the teacher's manual, suggested materials, and resources. However, due to the three-hour class period of each week, in each unit some relevant learning objectives to the course description were selected to fit in the class time limit (See the course content in Appendix 4). Then, the lesson plan was arranged and examined by the supervisor. In this pilot study, the lesson plan was experimented to teach a class of students, who was selected as the participants ($N = 52$) and registered for an English for Industrial Management course in semester 2 of the academic year 2017. During the teaching, the class was observed by the researcher and recorded by a video recorder. The results, derived from the researcher's observation and participants' interviews, were analysed by the content analysis which

categorised into themes (online self-study activity, in-class session, wrap-up session, improvement). The observation revealed that students were familiar with the use of computers incorporated or blended into the lesson. Moreover, they were active when participating into group work and game activities. However, within the three-hour class period, some learning objectives had to be skipped because of the time limit. From the interview, the participants revealed that they still realised the importance of face-to-face interaction in the classroom and demanded teacher’s facilitation, which could help them learn better and give them more opportunities to practice through tasks and activities. Furthermore, they also viewed that learning objectives or activities could be reduced to allow them more time to practice within the limited class time. Therefore, based on the results from the observation and interview, some learning objectives of the lesson plan in the main study should probably be reduced and adjusted to fit in the class time period in order to provide more practice, group collaboration and one-to-one interaction with teacher.

3.2.2.3 Summary of the results from the pilot study

In this pilot study phase, all research tools, including a pilot lesson, were trialled with as similar participants and setting as in the main study. The data were analysed to check for validity and reliability in order for the tools to be improved or adjusted for appropriateness and to be prepared for the data collection during the main study phase. From Table 3.15, considering the spread of the sample’s test scores, the tendency of the test scores could indicate the change of the outcome variables. Hence, from the pilot study, the proficiency test and vocabulary test would be practical to be administered for the main study. Furthermore, after the trial of questionnaire and interview, the results showed that the questionnaire’s reliability was high, and the interview questions could generate the answers to serve the research purposes. These tools then would be employed to obtain the qualitative data during the main study.

Table 3.15 Summary of the key results from the pilot study phase

Research tools	Measures	Statistics	Results	Implications
1. English Proficiency test	Language proficiency	Mean, S.D.	Students’ test scores were in an average level, and varied slightly.	To be used to test the participants language proficiency at the

Research tools	Measures	Statistics	Results	Implications
				beginning of the main study
2. Vocabulary test	Vocabulary knowledge	Mean, S.D.	Participants' test scores varied considerably, based on the large standard deviation. The tendency could represent the change from pre-test to post-test assessment.	To be used as pre-test, post-test, and delayed test
3. Questionnaire	Feasibility of a blended learning approach	Mean, S.D.	Reliability test was high and acceptable.	To be used to obtain qualitative data in the main study
4. Observation and interview		Content Analysis	Students were acquainted with the use of technology and were ready to be exposed to the online environment. But they still demand the importance of personal interaction and teacher's facilitation.	To be used to obtain qualitative data and improve the blended learning lessons for the main study

3.3 Main study

3.3.1 Research design

3.3.1.1 Quasi-experiment

The quasi-experimental design is used to examine the change of students' vocabulary learning and their retention of vocabulary knowledge through the support of a blended learning approach and explore the feasibility of the approach. This design is used because there are intact classes arranged according to students' registration; consequently, random assignment could not be undertaken. Therefore, to enhance the research validity, when the term started, in the first week, both groups took the English proficiency test (Preliminary English Test), permitted for use by Cambridge Assessment, including a vocabulary pre-test, to prove whether there is a pre-existing difference between the comparison groups (Phakiti, 2014). As presented earlier in Figure 3.3, "Pre-test-Post-test non-randomised control-group design" is used in this research design. Hence, the English proficiency test and pre-test were administered to both control and experimental groups at the beginning of the process. The difference which took place between the groups was that the experimental group was exposed to the treatment, while the other did not receive an intervention. For the rest of the process, the study groups took part in the same post-test and delayed test at the end of the course.

3.3.1.2 Scope of the study

As this research was conducted using a quasi-experiment design, the participants were 146 students, enrolling in an “English for Industrial Management” course at a university in Bangkok, Thailand. The university, which is one of educational institutions in the major field of science and technology, is keen on producing skilled graduates to serve organisations or industries in this area, corresponding to the government’s National Education Policy of “manpower development in science and technology.” This course was selected for this study because the course description is in accordance with the educational plan and learning objectives which can serve the students’ needs for the language use in the future work contexts. The duration of data collection lasted one semester (semester 1 academic year 2018) or approximately five months (August - November 2018). The research tools employed in this study consisted of a blended learning lesson plan, an English proficiency test, vocabulary pre-test and post-test, and delayed post-test, questionnaire and interview. The results were also derived from their test scores, individual and group interviews, and questionnaire responses.

3.3.2 Population and sample

The university mainly produces graduates to serve the needs in science and technology and industries. Generally, students are majoring in, such as engineering, applied science, technical education, agro-industry, industrial management and technology, and information technology. In the main study phase, a total of 146 samples were taken from four intact classes of undergraduate students (from Faculties of Engineering, and Architecture and Design) registered in the English for Industrial Management course. They varied from second to fourth year of the study, with ages ranging from 20 to 22. Because this research was conducted in a quasi-experimental design, the samples were assigned into control and experimental group based on their registered classes. Regarding the experimental group, the language lab was used and each student was seated individually with a personal computer provided for each seat, so they were able to watch the taught content through their own computer screen. The teacher instructed

through the control panel of the lab system, and could access each student's computer to monitor during activities and practice.

3.3.3 Study variables

Two types of variables are considered: independent and dependent, in experimental research. Cohen et al. (2007) and Phakiti (2014) define an independent variable as an input that causes or influences particular behavioural or psychological outcomes. Meanwhile, a dependent variable is affected by the input, or is the effect, as a consequence of, the independent variable being examined. Hence, to explore changes during the study, participants are probably exposed to different situations created by researchers. Based on the variables examined in this current research, both types of variables are stated as follows.

3.3.3.1 Independent variables

From the definition of an independent variable given previously, there is one input or independent variable which was manipulated in the experiment.

1) The use of a blended learning approach in teaching English language vocabulary in the English for Industrial Management course

3.3.3.2 Dependent variables

As stated above that a dependent variable is affected by an input or independent variable, the following three dependent variables are the effect in response to the use of a blended learning approach being examined in this study.

1) Students' increasing vocabulary knowledge

2) Students' vocabulary knowledge retention

3) Students' and teachers' attitudes and perceptions of a blended learning approach in EFL classrooms

3.3.4 Methods of data collection and analysis

3.3.4.1 English Proficiency test

The English proficiency test adapted from B1 Preliminary English Test (See sample pages of PET in Appendix 9), permitted to use by Cambridge Assessment, was employed to control and experimental groups in the first week of the course. In order to enhance the validity in conducting the

research, at the beginning of the data collection, the test was used to examine the participants' English language proficiency from both groups. As test specifications presented Appendix 8, this test, with total 60 items, was divided into two sections: listening (25 items) and reading (35 items). They were selected to use in order to be scored objectively and to reduce subjectivity as scoring in writing and speaking sections. The obtained language proficiency test scores were analysed by descriptive statistics, the test of normality, independent-samples *t*-test and analysis of variance, in order to compare between groups, academic majors, and between registered classes. Moreover, Pearson's *r* was used to analyse the correlations between English language proficiency, vocabulary knowledge and knowledge retention.

3.3.4.2 Vocabulary pre-test and post-test

To test students' vocabulary knowledge, their scores were analysed from a vocabulary multiple-choice test, administered as the pre-test in the first week and post-test after the intervention. As explained in 3.2.2.2, the *Vocabulary test* section in the pilot study, the test contained 130 items based on the content of 13 units selected from the coursebook, "In Company 3.0" (Clarke, 2014). From each unit ten items were constructed, that is, seven explicitly-taught words were selected from each unit, and three other untaught words were added to avoid a ceiling effect. In each item, four choices were provided with definitions, and the test taker must select the correct meaning to each word. The test specifications and word examples from the vocabulary pre-/post-test are available in Appendix 8.

Comparing mean differences in the groups, academic majors and classes, their pre-test scores were analysed to examine their pre-existing vocabulary knowledge at the commencement of the course, and the post-test scores were analysed to find a difference in the participants' increasing vocabulary knowledge after the intervention. Furthermore, gain scores between the pre-test to post-test were also analysed to look into the change in their vocabulary knowledge. As mentioned earlier in 3.3.4.1, the pre-existing and increasing vocabulary knowledge and other test scores were also analysed to find the correlations between them.

3.3.4.3 Delayed test

As one post-test is used to evaluate the outcome variable soon after the treatment ended, an equivalent form of another post-test could be administered to follow up or examine the intervention effects after a longer period of time (Cohen et al., 2018). In this research, to evaluate the knowledge retention of the content that was previously learnt, some studies (Gu, 2003; Nemati, 2010; Rott, 1999; Xiong, Wang, & Beck, 2015), conducted in an experimental setting, examined vocabulary memory or retention learning under the intervals of delayed testing, such as one week, after two weeks, or after four weeks. Schmitt (2008) also claimed that knowledge and learning could be considerably retained at certain percentages as evaluated from one-month delayed post-tests. In this study, students' vocabulary knowledge retention was evaluated one month after the course ended to investigate whether they could retain the vocabulary they learnt after the course finished. With this interval, threat to internal validity as maturation (Cohen et al., 2007) was likely to be low to affect high changes in the sample. To examine the participants' vocabulary knowledge retention, the scores derived from the delayed test were analysed to compare mean differences between the groups and between the classes. Moreover, gain scores derived from the change in scores between the pre-test to delayed test and between post-test to delayed test were analysed to look into the change in their vocabulary knowledge retention during the course and after the course ended.

3.3.4.4 Questionnaire

To examine the learners' perceptions and attitudes towards blended learning instruction in the English course, an online questionnaire was carried out at the post-course. The content in this questionnaire remained the same as the one which was trialled in the pilot study, and only spellings and grammatical mistakes were corrected. In the first part, students' personal data was collected to gain general information regarding their age, year of study and previous English courses taken, and to perceive their level of computer skills and experience in any previous online or blended learning courses. Apart from gaining the students' personal data, the Likert

scaling questionnaire, with an even point scale of four (strongly agree, agree, disagree and strongly disagree), also comprises four dimensions: attitudes towards blended learning, perceptions towards blended learning, perceptions towards blended learning instruction during the course, and suggestions for the blended learning course. Each dimension contained 10 items which were translated into Thai, which is the participants' first language, in order to avoid misunderstandings and misinterpretation towards the statements or questions. Table 3.16 shows the questionnaire's constructs, dimensions and sample items. The complete questionnaire is available in Appendix 1.

Table 3.16 Questionnaire's dimensions and sample items

Part	Constructs	Dimensions	Samples of items
1	Personal information	-	<ul style="list-style-type: none"> • Year of study • Age • Computer knowledge • Experience with online courses • Experience with blended learning
2	Blended learning instruction in the English course	1. Attitudes towards BL	<ul style="list-style-type: none"> • I am more engaged with the course in this blended learning environment. • I would recommend the blended learning course to friends or associates. • Blended learning gives me more or better opportunities to communicate with the instructor. • I feel a greater sense of satisfaction and achievement when learning English in blended learning environment.
		2. Perceptions towards blended learning	<ul style="list-style-type: none"> • Blended learning courses are useful and interesting. • It is easy to interact with friends or the teacher synchronously and asynchronously. • Teacher's feedback from the blended learning course supports my vocabulary learning. • Blended learning course helps increase the rate of my vocabulary knowledge retention.
		3. Perceptions towards blended learning instruction during the course.	<ul style="list-style-type: none"> • Blended Learning lessons are presented logically and clearly. • The quizzes and materials enhance my vocabulary learning. • Practice or reviews in this blended learning course are effective to use in improving my learning. • I use peer feedback to improve my learning.
		4. Suggestions for blended learning course	<ul style="list-style-type: none"> • There should be a training session for a blended learning course before it starts. • There should be more face-to-face interaction with teacher. • There should be more communication with teacher outside the classroom. • The course content should be less difficult.

After accumulating the responses of the questionnaire, they were analysed by descriptive statistics and reliability, to examine the participants' level of attitudes towards blended learning instruction. The results, then, were

reported (See the results chapter) in descriptive statistics based on each dimension.

3.3.4.5 Interview

At the end of the course, a semi-structured interview was conducted and recorded by using a sound-recording device. Ten participants were randomly selected in order to gain in-depth information about their learning in the blended learning environment. The interview process lasted approximately 10-15 minutes for each interviewee and was conducted in Thai, their native language, to avoid misunderstandings about the questions and for them to be able to convey their answers as accurately as possible. Here are the examples of the questions for the interview (All questions are shown in Appendix 2):

- At the beginning of this semester, did you participate in the blended learning course introduction?
- Did you participate in all activities during the course? Why or why not?
- Which part of the instruction helps improve your vocabulary learning?
- Does this blended learning course help you retain some vocabulary knowledge until the end of the course? Why/ How?
- Do you normally do your vocabulary practice? Does it help retain your vocabulary knowledge you learned from the course?
- Which part of the course is effective for your learning, classroom or online sessions?
- What suggestions or changes would you like to give to this blended learning course?

As additional evidence to support the obtained responses from the questionnaire, content analysis was used to investigate the interview results based on themes, such as in-class instruction, preferences to the course, proportion of a blended learning course, learning improvement, self-study, and knowledge retention. Then, the key answers from the students' interviews were highlighted and grouped into the relevant aspects.

3.3.4.6 Independent teacher observation

To gain additional information regarding the blended learning and instructional environment, an *independent teacher observation* was used as

one of the research tools to obtain the data through other teachers' perspectives. Furthermore, rubrics for the teacher observation consisted of four rating scales (1 = Needs improvement, 2 = Satisfactory, 3 = Good, 4 = Very good). The rubrics, adapted from existing institutional sources (University of Kerala; "UTeach Observation Protocol for Mathematics and Science,"), were designed based on the lesson's sessions (before-class, in-class, and wrap-up) and criteria, such as the lesson template, online self-study lesson, development of the lesson, learner engagement, class management and assessment and evaluation. Moreover, from these rubrics (See Appendix 3), the observers can provide meaningful feedback towards blended learning instruction, which would seek to answer the seventh research question regarding the extent to which the blended learning approach is feasible in the EFL classrooms. The independent teacher observation was conducted twice during the course, by two qualified English language instructors from the Language Department, Faculty of Applied Arts, who have over 10 years of teaching experience. After the observation, the teachers were also interviewed to gain more qualitative information of instruction. To obtain additional qualitative data regarding the feasibility of blended learning instruction through instructors' perspectives, the responses from their observation and interviews were analysed by content analysis, categorised into relevant aspects, such as lesson plan, before-class session, in-class session, class management and use of technology, assessment, and wrap-up session. The key content from the data was analysed and reported according to these aspects.

3.3.4.7 Researcher observation

Apart from the independent teacher observation, as the role of instructor who taught and managed the course, researcher observation was made to note the students' learning, behaviours, participation in activities or assignments, and problems or drawbacks occurred during the instruction. Consequently, after each class, I took notes of these observations in both experimental and control groups every week. The content analysis of the data was made and categorised based on the key aspects, such as

classroom setting, before-class participation, in-class session, and learners' behaviours.

3.3.5 The process of the experiment

After the research tools were constructed completely and prepared to be employed in the study, the overall process of the experiment lasted approximately almost six months (August - first week of January). The process basically comprised seven steps: sampling, providing treatment, testing, conducting independent teacher and researcher observation, distributing online questionnaire, interviewing the participants, and testing their vocabulary knowledge retention. These steps are represented with the following details.

3.3.5.1 Sampling

As this research was conducted following a quasi-experimental design, the step of sampling began in the first week of the course. Based on students' enrolment, four registered classes were specified as the samples in this study. Then, these groups were randomly assigned to control and experimental groups. After all, one class was assigned to the control group, and three others were assigned to the experimental group. In the same week, the English proficiency test and the vocabulary pre-test were administered to prove the pre-existing difference of English language proficiency and vocabulary knowledge between these study groups.

3.3.5.2 Treatment

From the 2nd to the 16th week, all groups were exposed to the same course content. The control group was taught by the traditional face-to-face teaching method, while the experimental groups were exposed to the blended learning approach which combines face-to-face and online teaching methods, and incorporates technology-mediated instruction into the course. With this approach, learners were engaging in both classroom and online interaction and practice, with peer and teacher feedback given to their learning. According to the course content, the following information presents course description, objectives, materials, and lesson plan.

Course description

The English for Industrial Management course is focused on teaching language skills in business and industrial management, related to planning, finance, production, marketing, and human resource management.

Course Objectives

After taking this course, students should be able to:

- 1) use technical English language in production, corporate, finance, HR, marketing, safety, career, and business management;
- 2) participate in formal and informal conversations in a business context;
- 3) express ideas and practice writing on industrial management topics; and
- 4) give a basic oral presentation in a business context using appropriate visual aids.

Course materials

The course content was selected from a coursebook (See Appendix 4), *In Company 3.0 (Pre-intermediate)* (Clarke, 2014). The reason why this student book was selected for the course was that the language proficiency level suits the students and their major which was not English. Furthermore, the content was applicable in the working context (offices, companies, factories, etc.). Thirteen units were selected to fit in the timeframe of the term time, and each unit took one week to complete. The course syllabus is presented in Appendix 5 with learning objectives and language points.

Lesson plan

As presented in Table 3.17, the course lasted one semester, approximately four months or 16-17 weeks. The participants were exposed to the course content from 2nd-16th week. The table shows the overall timing of instruction and exams.

Table 3.17 Timing of instruction and exam weeks

Semester 1/2018				
Week 1	Week 2-8	Week 9	Week 10-16	Week 17
<ul style="list-style-type: none">• Introduction• Pre-tests	Instruction (unit 1-3, 5-7, 9)	<ul style="list-style-type: none">• Midterm exam	Instruction (unit 10-11, 14-15, 18-19)	<ul style="list-style-type: none">• Final exam

Blended learning instruction vs Traditional classroom

The participants had English classes three hours per week. The experimental group was taught in the flipped classroom and the traditional classroom setting was allocated to the control group. The characteristics of the blended learning and traditional classroom instruction conducted in this study are represented in Figures 3.11 and 3.12.

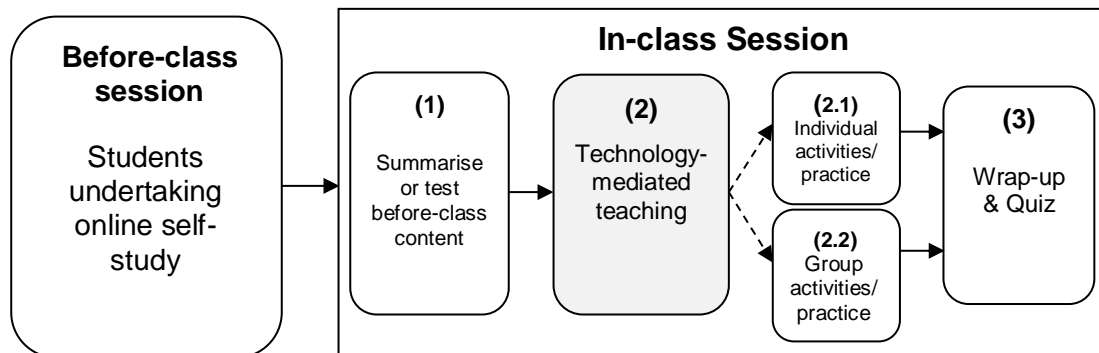


Figure 3.11 Overview of the blended learning instruction

Figure 3.11 illustrates an overview of the blended learning model, adapted from Köse (2010) and LaRue (2012) and used in this course. It mainly consists of online before-class and classroom sessions. This model was applied from the “flipped classroom” model which incorporates technology to switch what is learnt in the classroom to an out-of-class online learning platform through learners’ responsibility, and they would be exposed to (more) practice or collaboration in their class time (Stein & Graham, 2014; Tucker et al., 2017). Previous studies related to the flipped classroom model also revealed its useful application to English language teaching in the EFL contexts (Alsowat, 2016; Anwar, 2017; Dong, 2016; Engin, 2014b; Han, 2015; Sun, 2016; Zhang et al., 2016) and the enhancement of learners’ attitudes and motivation in higher education (Rodrigues & Mouraz, 2015). According to the overview in Figure 3.11, first, in a before-class session, students were assigned to undertake online self-study, made by the teacher, outside the classroom or before the class started. The online content contained the language content explanation or summary and follow-up quizzes. Students could view, re-watch or re-do the quizzes as they wanted to. Then, in Stage 2 (face-to-face/in-class session), the class took place entirely in a computer lab and the content from the before-class

session was briefly summarised at the beginning. Then, practice though tasks and activities was assigned to groups or individuals by working on online educational platforms and Web 2.0 technologies, such as Google Education, Facebook, or YouTube videos, including the use of the coursebook resources. Finally, the class ended with wrap-up activities or summary of what was learnt and students then took a weekly online end-of-unit quiz at the end of the class. After class, the class content and vocabulary review summary were posted on the Facebook group which was also used for the class notifications.

Apart from the points gained from semester exams, the points from the learning activities from the face-to-face and online approaches were calculated. Table 3.18 indicates the course evaluation which consisted of the point values from before-class session that students in the experimental group were assigned to complete out-of-class online learning content. Points were also given through their attendance and in-class participation in group or individual activities. Moreover, the rest of point values were received from end-of-unit quizzes in each week, midterm and final exams, and vocabulary post-tests.

Table 3.18 Blended learning class: Course evaluation (Point values of 100%)

Evaluation	100%
- Before-class session • Online self-study assignments	(5)
- In-class session • Individual/group work participation • Attendance	(5) (5)
- End-of-unit quizzes	(10)
- Vocabulary post-tests (organised as the additional part in the midterm and final exams)	(10)
- Midterm exam	(35)
- Final exam	(30)

In the traditional classroom (Figure 3.12), each week started students were assigned to study the class content beforehand through an out-of-class task or exercise in the coursebook and without teaching. When the class started, introduction to the lesson was provided and a group of them was assigned to quickly summarise the out-of-class content that they studied. In the

classroom, the students learned the weekly lesson through the teacher's lecture at the centre. Then they practiced through individual or group activities or tasks. Before the class ended, the content was wrapped up and they took a weekly paper-based end-of-unit quiz of what they learned. In the traditional classroom, technology may be slightly employed, but not as mainly as in the blended learning environment, that is, PowerPoint slides were used as a teaching aid during the lecture and a Facebook group was used as a contact medium with the students after class.

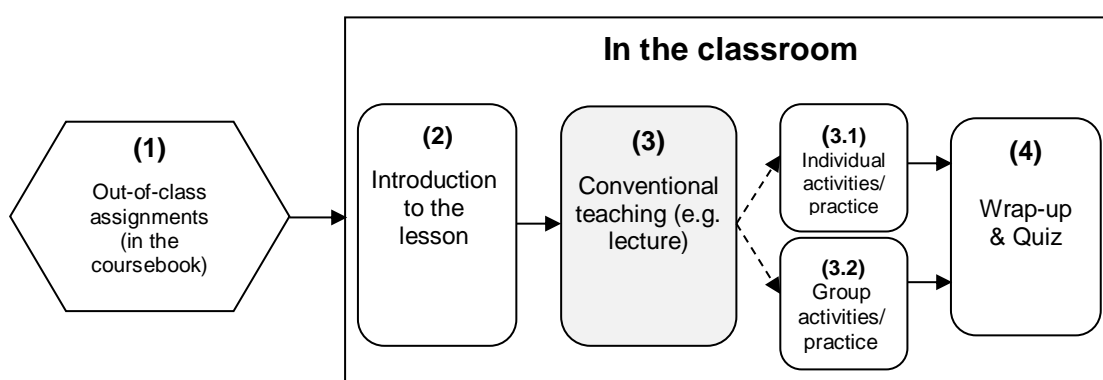


Figure 3.12 Overview of the traditional classroom setting

With respect to the course evaluation in the traditional classroom setting, as shown in Table 3.19, most of the point values were as same as in the blended learning group, except before-class session which was replaced by the point values for out-of-class assignments (5%) in the traditional classroom.

Table 3.19 Traditional classroom: Course evaluation (Point values of 100%)

Evaluation	100%
- Out-of-class assignments (coursebook exercises, group assignments)	(5)
- In-class session <ul style="list-style-type: none"> • Individual/group work participation • Attendance 	(5) (5)
- End-of-unit quizzes	(10)
- Vocabulary post-tests (organised as the additional part in the midterm and final exams)	(10)
- Midterm exam	(35)
- Final exam	(30)

3.3.5.3 Testing

In this section, the timeframe of test administration is presented in Table 3.20. In the first week of the course, the process began with testing the participants' language proficiency and vocabulary knowledge. The English language proficiency test and the vocabulary pre-test were organised during that week. Due to participants' study time constraints in that semester, the vocabulary post-test was divided into two sets which were held additionally during the midterm (Week 9) and final (Week 17) examinations. Hence, the post-tests 1 and 2 contained the particular content taught in the previous weeks – before and after the midterm exam. Finally, to examine the samples' vocabulary knowledge retention, another equivalent form of post-test was administered one month after the course ended or in the first week of the following term time.

Table 3.20 Timeframe of test administration

Term 1/2018			Term 2/2018
Week 1	Week 9	Week 17	Week 1
<ul style="list-style-type: none"> English proficiency test (60 items) Vocabulary pre-test (130 items) 	<ul style="list-style-type: none"> Midterm exam Vocabulary post-test (1) (70 items) 	<ul style="list-style-type: none"> Final exam Vocabulary post-test (2) (60 items) 	<ul style="list-style-type: none"> Vocabulary delayed test (130 items)

3.3.5.4 Independent teacher and researcher observations

During the course, two class periods of the experimental group, which was exposed to the blended learning environment, were randomly selected for the independent teacher observation, and observed by two English language instructors from the Language Department, Faculty of Applied Arts, who have over 10 years of teaching and research experience with EFL learners. With the rubrics constructed (See Appendix 3), the teachers were guided by the specified criteria and scales during the observation. After completing the observation, the teachers were invited to participate in a follow-up interview to gain additional qualitative information regarding the use and feasibility of the blended learning instruction. Moreover, the researcher observation was conducted each week with both experimental and control groups to note what occurred during the instruction, such as students' participation, behaviours, or problems.

3.3.5.5 Questionnaire distribution

As the purpose of the questionnaire stated in 3.3.4.4, in the last week of the course, participants from the experimental group were invited to complete the online questionnaire which was available at: <https://durham.online-surveys.ac.uk/mainstudy>. Demographically, most of the respondents were studying in the third and fourth year, with ages ranging from 21 to 24. They have studied English for approximately 10-15 years and took at least 3-4 English language courses in the past years of their study. Furthermore, their computer knowledge level ranged from average to good. Regarding their overall experience with online courses, it was scaled from “not at all” to “somewhat” responses. Similarly, their experience with blended learning ranged from “slightly” to “moderately.”

3.3.5.6 Semi-structured interview

In the last week of the course, ten participants from the experimental group were randomly selected to take part in a semi-structured interview. They were asked questions, as exemplified in 3.3.4.5, regarding blended learning instruction.

3.3.5.7 Delayed test

To examine the participants’ vocabulary knowledge retention, a delayed test, as described in 3.3.4.3, was administered one month after the course ended. Students who took the English for Industrial Management course were asked to participate in taking the test in the first week of the following semester.

3.3.6 Summary of the process of the experiment

The process of conducting the experimental inquiry in this research is summarised in the flowchart as shown in Figure 3.13.

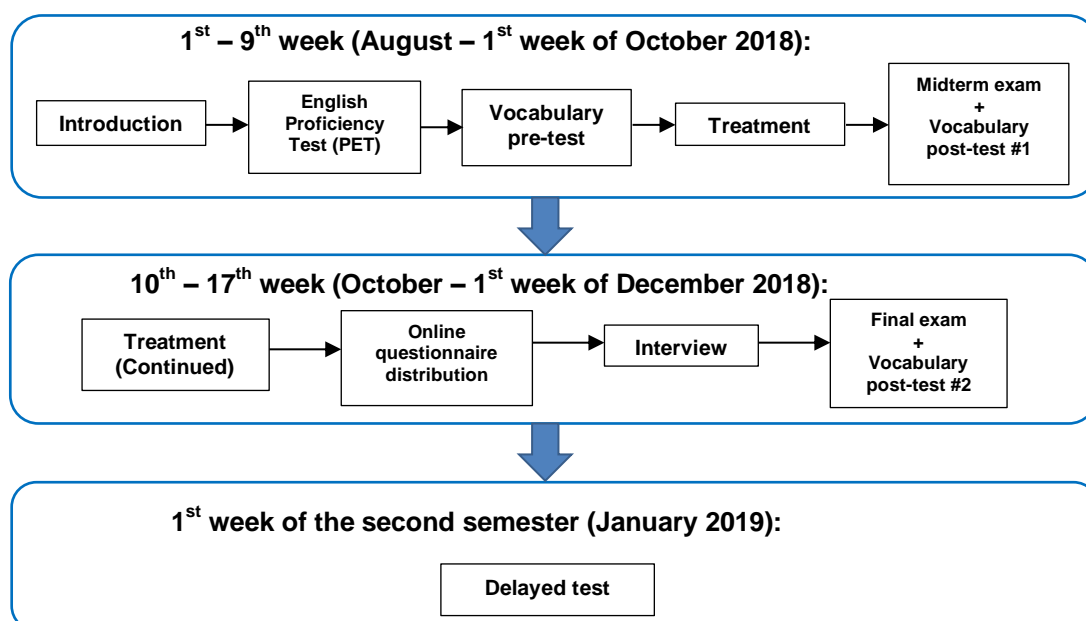


Figure 3.13 Flowchart of the process of the experiment

As can be seen, it took 17-18 weeks in total to complete the whole process. At the very beginning of the process, an introduction was organised during the first week to provide students with the course information, such as learning objectives, materials, schedule, and evaluation. During the same week, the English proficiency test and vocabulary pre-test were administered to prove students' English language proficiency and vocabulary knowledge before starting instruction. From 2nd to 8th week, participants in the experimental group were given the intervention by the use of a blended learning approach, while the control group was exposed to the traditional instructional method as mentioned previously in 3.3.5.2. During the weeks of instruction, the class of the experimental group was also observed by two full-time English language teachers. In the 9th week, students took the midterm exam and vocabulary post-test #1 of which content covered the units taught in the first half of the course (2nd - 8th week). After the midterm exam week (9th week), instruction was continued from 10th to 16th week, with another independent teacher observation in this second half of instruction. In the last week of the course (16th week), an online questionnaire was distributed to the participants in the experimental group. Moreover, ten students from this group were randomly assigned to participate in the semi-structured interview at the end of the course to obtain more profound information pertaining to the blended learning environment.

In 17th week, students took the final exam and vocabulary post-test #2 which covered the content taught in the second half of the course. Finally, one month after the course ended, students who took this course were asked for an extra participation to take the delayed post-test in the first week of the following semester to examine their knowledge retention of the vocabulary learnt from the course.

3.3.7 Data analysis

After the process of the experiment was completed, the data collected throughout the study were divided into two types of analysis: quantitative and qualitative analyses.

3.3.7.1 Quantitative analysis

Quantitative data was collected from test scores and questionnaire items and was then computed through statistical software using the following statistics which are described in relation to the analysis in this study.

Descriptive statistics

Means, S.D. were mainly stated in descriptive statistics for quantitative data: test scores, gain scores; and qualitative data: questionnaire. Median was also included in reporting the data from a non-parametric test. To explore the normal distribution of the data, the test of normality was conducted to check the shape of the score distribution in PET, pre-test, post-test and delayed test, and the Shapiro-Wilk test indicated the values of significant difference data distribution.

Independent-samples t-test

Based on this study, to determine the significant difference between two studied groups, an independent-samples *t*-test was used to analyse the difference of dependent variables [English language proficiency test (PET), pre-test, post-test, delayed test, gain scores] between control and experimental groups, male and female students, and two academic majors.

Mann-Whitney U test

Apart from the independent-samples *t*-test, when a non-normal distribution was identified and (or) unequal variances occurred with the scores, it was likely that all basic assumptions for parametric tests were not met.

Consequently, a non-parametric test, Mann-Whitney U, was additionally conducted to re-examine the difference of the data between two different groups or to find out whether their scores of PET, pre-test, post-test, and delayed test were significantly different.

One-way ANOVA

As one research question was sought to compare the participants' scores between the different registered classes, One-way ANOVA was conducted to explore the difference of the dependent variables (PET, pre-test, post-test, delayed test and gain scores) between the classes.

Kruskal-Wallis H test

Another non-parametric test, Kruskal-Wallis H, was used in this study when non-normal score distribution and (or) unequal variances occurred. Apart from One-way ANOVA, the test was conducted to re-examine and compare a significant difference in students' scores of English language proficiency, pre-test, post-test and delayed test between different classes.

ANCOVA

When the difference in pre-existing vocabulary knowledge or pre-test scores was found, ANCOVA was conducted to compare between two or more groups [between-subjects factor: group (experimental, control); covariate: pre-test]. In other words, ANCOVA was subsequently conducted to examine if there was a similar significant difference to the *t*-test, when the pre-test was taken as a covariate. Regarding the reliability in interpreting results from ANCOVA, the assumptions for the data were examined by checking the residuals and equality of variances. If the assumption was met for ANCOVA, a normality check was carried out to explore the standardised residuals. However, if the assumptions were not met, a non-parametric test would be considered as another option for analysis.

Effect size

Apart from finding out the differences of statistical significance between the studied groups, an effect size was calculated to determine the practical significance (of an independent variable affecting a dependent variable) within the context of an empirical study. In this study, there were effect size

values from the independent-samples *t*-test (*d*) calculated based on mean and S.D. by using a web-based effect-size calculator (Wilson, n.d.), from the Mann-Whitney U test (*r*) calculated by ' $r = Z/\sqrt{N}$ ', and from ANCOVA [Partial Eta squared (η_p^2)] calculated through the statistical software. *Cohen's d* (for *d* and *r* values) was used as an effect size indicator (0.2 - 0.4 = small; 0.5 - 0.7 = medium; 0.8 or >0.8 = large). Another effect size value in this study, Partial Eta squared (η_p^2), was reported in percentage of the variability of the dependent variable was influenced by the independent variable.

Pearson's r

To find out the relationship between two continuous variables, the Pearson correlation was conducted in this study. It analysed the relationships between students' English language proficiency (PET), pre-existing vocabulary knowledge (pre-test), increasing vocabulary knowledge (post-test), and vocabulary knowledge retention (delayed test).

Reliability test

In this study, the reliability test was conducted to analyse the delayed test scores and questionnaire data. The values from the test indicated the consistency of test takers' responses or the questionnaire rating. The interpretation for *r* or reliability coefficient value of >.90 is considered high reliability, and <.70 indicates limited applicability.

3.3.7.2 Qualitative analysis

Qualitative data collected in this study, i.e. student interview, independent teacher observation and interview, and researcher observation, were analysed by the following analysis.

Content analysis

The qualitative data (student and independent teacher interviews, notes from the teacher and researcher observations) was analysed using content analysis which is used to determine the presence of words or concepts through texts or information transcribed from the recordings. The key words and meanings were investigated in relevance to the specified concepts, through the process of coding and distinguishing the relevant information. The students' and teachers' statements from the interviews were

transcribed and categorised into themes based on the rubrics related to perceptions and attitudes towards the blended learning approach and instruction. Moreover, the notes from the teacher and research observations were also coded into categories for themes related to the blended learning instruction.

To provide the overall statistical analyses used with each test and tool in this study, Table 3.21 presents the summary in regard to the study variables and based on each research question.

Table 3.21 Summary of statistical analyses used in this study

Variables	Research Questions	Subjects	Research tools & Statistical Analyses										
			PET	Pre-test (130 items)	Post-test (130 items)	Delayed test (130 items)	Gain scores: pre-test - post-test	Gain scores: pre-test - delayed test	Gain scores: post-test - delayed test	Questionnaire	Interview	Teacher observations	Researcher observation
1. Enhancement of vocabulary learning 2. Vocabulary knowledge retention	RQ1: To what extent does blended learning enhance students' vocabulary knowledge?	Experimental group vs. Control group	- Mean, SD - Test of normality - <i>t</i> -test* - Mann-Whitney U Test	- Mean, SD - Test of normality - <i>t</i> -test* - Mann-Whitney U Test	- Mean, SD - Test of normality - ANCOVA - Mann-Whitney U Test	-	- Mean, SD - <i>t</i> -test*	-	-	-	-	-	-
	RQ 2: To what extent do students retain their vocabulary knowledge?	Experimental group vs. Control group	-	- Mean, SD Test of normality - <i>t</i> -test* - Mann-Whitney U Test	-	- Mean, SD - Test of normality - ANCOVA - Reliability test	-	- Mean, SD - <i>t</i> -test*	- Mean, SD - <i>t</i> -test*	-	-	-	-
	RQ 3: Are male students' test scores different from female students'?	male -female (Experimental) + male-female (Control)	- Mean, SD - Test of normality - <i>t</i> -test* - Mann-Whitney U Test	- Mean, SD - Test of normality - <i>t</i> -test* - Mann-Whitney U Test (for Exp. group)	-Mean, SD -Test of normality -ANCOVA -Mann-Whitney U Test (for Cont. group)	- Mean, SD Test of normality - ANCOVA - Mann-Whitney U Test	- Mean, SD - <i>t</i> -test*	- Mean, SD - <i>t</i> -test*	- Mean, SD - <i>t</i> -test*	-	-	-	-

* Independent-samples *t*-test

Table continued

Variables	Research Questions	Subjects	Research tools & Statistical Analyses										
			PET	Pre-test (130 items)	Post-test (130 items)	Delayed test (130 items)	Gain scores: pre-test - post-test	Gain scores: pre-test - delayed test	Gain scores: post-test - delayed test	Questionnaire	Interview	Teacher observations	Researcher observation
	RQ 4: Are engineering major students' test scores different from architecture major students'?	engineering students vs. architecture students	- Mean, SD - Test of normality - <i>t</i> -test* - Mann-Whitney U Test	- Mean, SD - Test of normality - <i>t</i> -test* - Mann-Whitney U Test	- Mean, SD - Test of normality - ANCOVA	-	- Mean, SD - <i>t</i> -test*	-	-	-	-	-	-
	RQ 5: To what extent do students' test scores differ between the classes?	All registered classes	- Mean, SD - Test of normality - ANOVA - Kruskal-Wallis H test	- Mean, SD - Test of normality - ANOVA - Kruskal-Wallis H test	- Mean, SD - Test of normality - ANOVA - ANCOVA - Kruskal-Wallis H test	- Mean, SD - Test of normality - ANOVA - ANCOVA - Kruskal-Wallis H test	- Mean, SD - ANOVA	- Mean, SD - ANOVA	- Mean, SD - ANOVA	-	-	-	-
	RQ 6: To what extent are there correlations between students' English language proficiency, pre-existing vocabulary	Experimental and control groups	Mean, SD Pearson's <i>r</i>	Mean, SD Pearson's <i>r</i>	Mean, SD Pearson's <i>r</i>	Mean, SD Pearson's <i>r</i>	-	-	-	-	-	-	-

* Independent-samples *t*-test

Table continued

Variables	Research Questions	Subjects	Research tools & Statistical Analyses											
			<i>PET</i>	<i>Pre-test (130 items)</i>	<i>Post-test (130 items)</i>	<i>Delayed test (130 items)</i>	<i>Gain scores: pre-test - post-test</i>	<i>Gain scores: pre-test - delayed test</i>	<i>Gain scores: post-test - delayed test</i>	<i>Questionnaire</i>	<i>Interview</i>	<i>Teacher observations</i>	<i>Researcher observation</i>	
	knowledge, increasing vocabulary knowledge and vocabulary knowledge retention?													
3. Feasibility of a blended learning approach	RQ 7: To what extent is the use of a blended learning approach feasible?	Experimental group	-	-	-	-	-	-	-	-	- Mean, S.D. - Reliability test	-	-	-
		Randomly selected students (Experimental group)	-	-	-	-	-	-	-	-	-	Content analysis	-	-
		English language instructors	-	-	-	-	-	-	-	-	-	-	Content analysis	
		Students from experimental and control groups	-	-	-	-	-	-	-	-	-	-	-	Content analysis

3.4 Summary to this chapter

As this chapter aims to provide detailed information and explanations of the research methods, instruments, data collection process, the reasons of implementing them, and the sequential process of data collection. In this final section, Table 3.22 summarises all research instruments, based on types of analysis and research questions, measures, obtained data, and statistics. Furthermore, Table 3.23 illustrates the complete data collection in each study group, responding to types of analysis, research questions, including timeframe at the fieldwork site.

Table 3.22 Summary of research tools and data analysis

Types of analysis	Research questions	Research instruments	Measures	Data used for analysis	Analysis approach
Quantitative analysis	RQ 1: To what extent does blended learning enhance students' vocabulary knowledge?	1) Vocabulary pre-test (130 items)	Increasing vocabulary knowledge	Test scores Gain scores	<ul style="list-style-type: none"> • Mean • S.D. • Test of normality • Independent <i>t</i>-test • Mann-Whitney U Test • ANCOVA
		2) Vocabulary post-test #1 (70 items) and post-test #2 (60 items)			
Quantitative analysis	RQ 2: To what extent do students retain their vocabulary knowledge?	1) Vocabulary pre-test (130 items)	Retention of vocabulary knowledge	Test scores Gain scores	<ul style="list-style-type: none"> • Mean • S.D. • Test of normality • Independent <i>t</i>-test • Mann-Whitney U Test • ANCOVA • Reliability
		2) Vocabulary post-test #1 (70 items) and post-test #2 (60 items)			
		3) Vocabulary delayed test (130 items)			
Quantitative analysis	RQ 3: Are male students' test scores different from female students'?	1) Proficiency test (60 items)	Gender differences in language proficiency, increasing vocabulary knowledge and knowledge retention	Test scores Gain scores	<ul style="list-style-type: none"> • Mean • S.D. • Test of normality • Independent <i>t</i>-test • Mann-Whitney U Test • ANCOVA
		2) Vocabulary pre-test (130 items)			
		3) Vocabulary post-test #1 (70 items) and post-test #2 (60 items)			
		4) Vocabulary delayed test (130 items)			

Types of analysis	Research questions	Research instruments	Measures	Data used for analysis	Analysis approach
Quantitative analysis	RQ 4: Are engineering major students' test scores different from architecture major students'?	1) Proficiency test (60 items)	Differences between the two academic majors in language proficiency and increasing vocabulary knowledge	Test scores Gain scores	<ul style="list-style-type: none"> • Mean • S.D. • Test of normality • Independent <i>t</i>-test • Mann-Whitney U Test • ANCOVA
		2) Vocabulary pre-test (130 items)			
		3) Vocabulary post-test #1 (70 items) and post-test #2 (60 items)			
Quantitative analysis	RQ 5: To what extent do students' test scores differ between the classes?	1) Proficiency test (60 items)	Differences in language proficiency, increasing vocabulary knowledge and knowledge retention, between the registered classes	Test scores Gain scores	<ul style="list-style-type: none"> • Mean • S.D. • Test of normality • ANOVA • Kruskal-Wallis H Test • ANCOVA
		2) Vocabulary pre-test (130 items)			
		3) Vocabulary post-test #1 (70 items) and post-test #2 (60 items)			
		4) Vocabulary delayed test (130 items)			
Quantitative analysis	RQ 6: To what extent are there correlations between students' English language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge and vocabulary knowledge retention?	1) Proficiency test (60 items)	Relationships between English language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge and vocabulary knowledge retention	Test scores	<ul style="list-style-type: none"> • Mean • S.D. • Pearson's <i>r</i>
		2) Vocabulary pre-test (130 items)			
		3) Vocabulary post-test #1 (70 items) and post-test #2 (60 items)			
		4) Vocabulary delayed test (130 items)			
Quantitative analysis	RQ 7: To what extent is the use of a blended learning approach feasible?	1) Questionnaire (40 items)	Overall assessment of the feasibility of a blended learning approach	Scaled responses	<ul style="list-style-type: none"> • Mean • S.D.
Qualitative analysis		2) Independent teacher observation		Transcriptions	Content analysis
		3) Researcher observation		Transcriptions	Content analysis
		4) Interviews (students & teachers)		Transcriptions	Content analysis

As illustrated in Table 3.22, seven research questions are addressed in this study. Statistical analyses by descriptive statistics, test of normality, Independent *t*-test, Mann-Whitney U Test, and ANCOVA were used to analyse the test scores and gain scores from research questions 1, 2, 3 and

4 (RQs 1-4), which examined students' increasing vocabulary knowledge, the retention of their vocabulary knowledge, gender differences, and differences between two academic majors, respectively. In research question 5 (RQ5), which sought to investigate differences of test scores between the registered classes, the test scores were analysed by descriptive statistics, test of normality, One-way ANOVA, Kruskal-Wallis H test and ANCOVA. To examine additional aspect on the participants' scores, research question 6 (RQ6) was posted to study the relationships between all test scores, which were analysed by descriptive statistics and Pearson's correlation. In the last research question, qualitative data were collected to explore the participants' in-depth information towards the extent to which blended learning instruction was feasible. To obtain the data, an online questionnaire was distributed online and responded by 31 participants who were taught in the blended learning environment, and the responses from the questionnaire were analysed by descriptive statistics. Furthermore, additional qualitative data from independent teacher observation, researcher observation and interviews were gathered and interpreted through the content analysis.

Table 3.23 illustrates another summary of the timeframe in data collection which corresponds to the research questions, tests, when the experimental and control groups were assigned to each research instrument, and types of analyses (quantitative or qualitative) used for each tool. In terms of quantitative data, PET, the pre-test and post-test were administered in the first term, and the delayed test was conducted in the first week of the following semester. The tests measured students' English language proficiency, vocabulary knowledge and knowledge retention to answer the research questions 1-6, and to compare between the experimental and control groups, different genders, academic majors and classes. To answer the last research question regarding the feasibility of blended learning instruction, a questionnaire, interviews, and teacher and researcher observations were employed to collect the qualitative data during the 2nd - 8th and 10th - 16th week of the first term.

Table 3.23 Summary of the timeline in data collection

Term	1 st (Aug.- Nov. 2018)						2 nd (Jan. 2019)
Week	1	2 - 8	9 (Midterm exam week)	10-16	16	17 (Final exam week)	1
Data collection	Language proficiency test (PET) (65 items) Pre-test (130 items) *RQs = 1,3,4,5,6 Quantitative analysis	Intervention *RQ = 7 Qualitative analysis (noted through an independent teacher observation and researcher observation)	Post-test #1 (70 items) *RQs = 1,3,4,5,6 Quantitative analysis	Intervention (continued) *RQ = 7 Qualitative analysis (noted through an independent teacher observation and researcher observation)	Questionnaire Interview *RQ = 7 Quantitative analysis Qualitative analysis	Post-test #2 (60 items) *RQs = 1,3,4,5,6 Quantitative analysis	Delayed test (130 items) *RQ = 2,3,4,5,6 Quantitative analysis
Experimental group	PET + Paper-based vocabulary test (multiple-choice)	Blended learning approach	Paper-based vocabulary test (multiple-choice)	Blended learning approach	Blended learning questionnaire + semi-structured interview	Paper-based vocabulary test (multiple-choice)	Paper-based vocabulary test (multiple-choice)
Control group	PET + Paper-based vocabulary test (multiple-choice)	Traditional teaching approach	Paper-based vocabulary test (multiple-choice)	Traditional teaching approach	No distribution	Paper-based vocabulary test (multiple-choice)	Paper-based vocabulary test (multiple-choice)

***(to answer) Research questions:**

- *RQ1: To what extent does blended learning enhance students' vocabulary knowledge?
- *RQ2: To what extent do students retain their vocabulary knowledge?
- *RQ3: Are male students' test scores different from female students'?
- *RQ4: Are engineering major students' test scores different from architecture major students'?
- *RQ5: To what extent do students' test scores differ between the classes?
- *RQ6: To what extent are there correlations between students' English language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge and vocabulary knowledge retention?
- *RQ7: To what extent is the use of a blended learning approach feasible?

As methodology summarised and strengths mentioned with respect to this research design, its limitations have also been identified to address some of the weaknesses in this study. In the next chapter, quantitative and qualitative findings of the study were analysed and will be reported in detail.

4. Results

4.1 Introduction

As research problem mentioned earlier in the first chapter, it is necessary for graduates to be skilled and have the potential to meet the needs of industries or organisations. Furthermore, with the university's current situation regarding limited one-to-one interaction in a large class size and teachers required to commute to campuses in different locations, blended learning could be a solution which gives different outcomes as, based on several studies, it promotes learner autonomy vocabulary learning skills. To cope with the limitations and to correspond with the university's policy in the efficiency of instructional management and cost-effectiveness, this study aimed to investigate the feasibility of a blended learning approach regarding Thai EFL students' vocabulary knowledge and vocabulary knowledge retention at a university in Bangkok through the emphasis of face-to-face and technology-mediated learning. At the fieldwork site, the flipped classroom, one of blended learning approaches, was employed as several L2/EFL-related research studies indicated the approach's significance in English language learning, autonomous learning and in-class practice. From the main study, quantitative data derived from the scores of pre-test, post-test, and the delayed test were explored from different aspects. Apart from experimental and control groups being compared, between-gender participants (male - female), between-major subjects (engineering and architecture students) and all registered classes were also examined. In addition, the data from all of the subjects were analysed to explore the correlations between students' English language proficiency, vocabulary knowledge and retention of vocabulary knowledge. Furthermore, qualitative data, gathered from questionnaire and interview, were employed as additional evidence to support the aspect of feasibility in blended learning. In the following sections, the findings are presented in details based on each of the seven research questions (RQs 1-7).

Research question 1

RQ1: To what extent does blended learning enhance students' vocabulary knowledge?

Regarding this first research question, we will look into the enhancement of participants' vocabulary knowledge between experimental and control groups. The results derived from their language proficiency test (PET), pre-test, post-test, and gain scores of pre-test - post-test, are explained based on each score as follows.

PET Scores

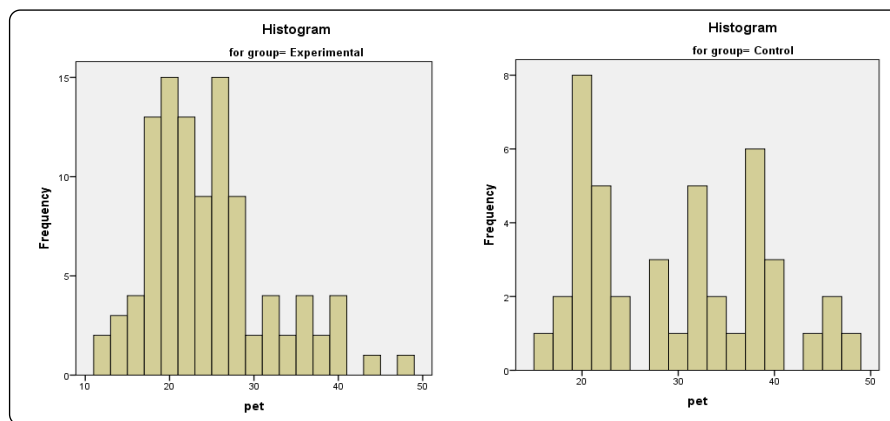


Figure 4.1 PET scores of students between the experimental and control groups

Regarding the language proficiency test (PET) taken at the beginning of the course, Figure 4.1 shows the participants' PET scores between the two groups. There were 103 students from the experimental group and 43 students from the control group (experimental: $M = 24.12$, $SD = 7.11$; control: $M = 29.40$, $SD = 9.06$). To examine the score distribution, the test of normality was conducted, and the output is presented in Figure 4.2.

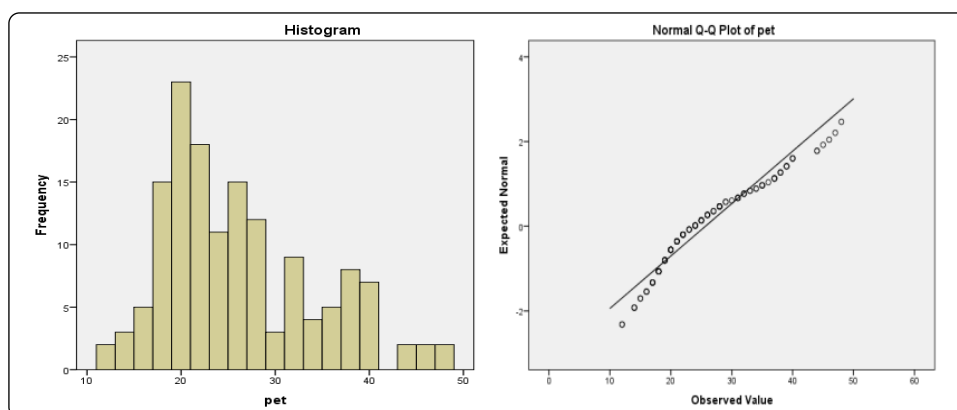


Figure 4.2 Output of the normality check for PET scores (all subjects)

Figure 4.2 shows the histogram and normal Q-Q plot for PET scores which seemingly illustrated an approximate distribution. However, a Shapiro-Wilk test indicated that the PET scores was not normally distributed, $D(146) = .937, p < .001$. To analyse the difference in PET scores between the two groups, an independent-samples t -test was conducted. First, it indicated unequal variances, $F = 8.660, p = .004$. The t -test, then, revealed that PET scores, between t groups, were different, $t(144) = 3.76, p < .001, d = -0.68$, more than might be expected from the sampling. The effect size ($d = -0.68$) also indicated that the control group's language proficiency was somewhat better than the other group.

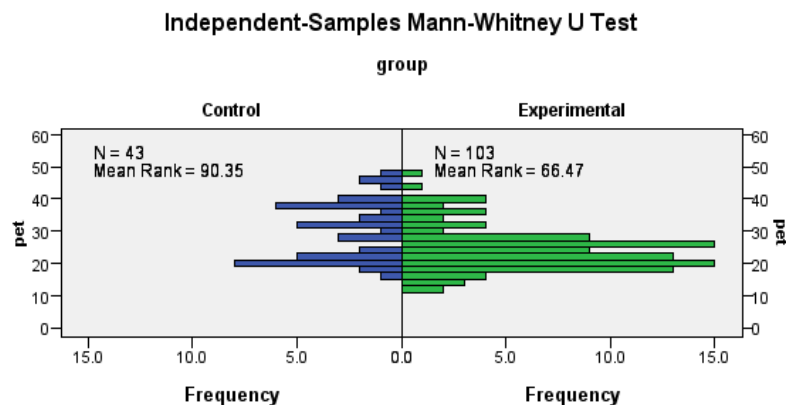


Figure 4.3 Mann-Whitney U test of PET scores

According to Figure 4.3, the Mann-Whitney U test also confirmed that PET scores were significantly different between the experimental group ($Mdn = 23$), and the control group ($Mdn = 30$), $U = 1490.0, p = .002, r = -0.26$. Participants' PET scores, at the beginning of the course, on the control group were higher than the experimental group. In other words, the participants from the control group were likely to have had higher English language proficiency than the other group.

Pre-test scores

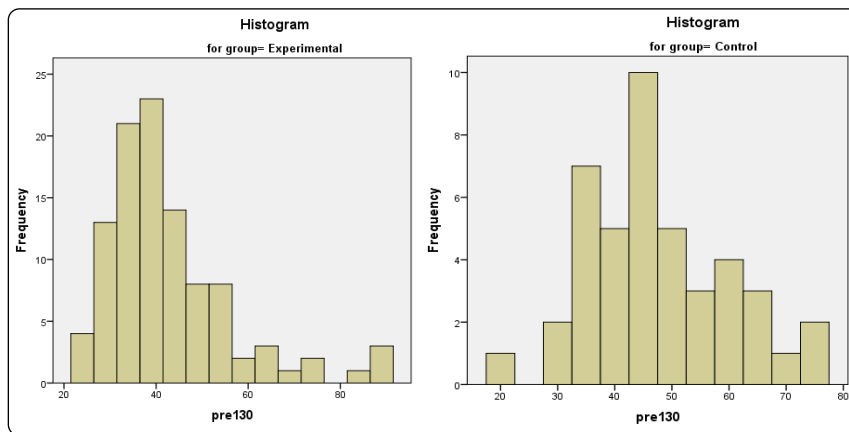


Figure 4.4 Pre-test scores of students between the experimental and control groups

Figure 4.4 shows the participants' pre-test scores between the two groups. (experimental: $M = 42.61$, $SD = 13.72$; control: $M = 47.42$, $SD = 12.48$). To examine the score distribution, the test of normality was conducted, and the output is presented in Figure 4.5.

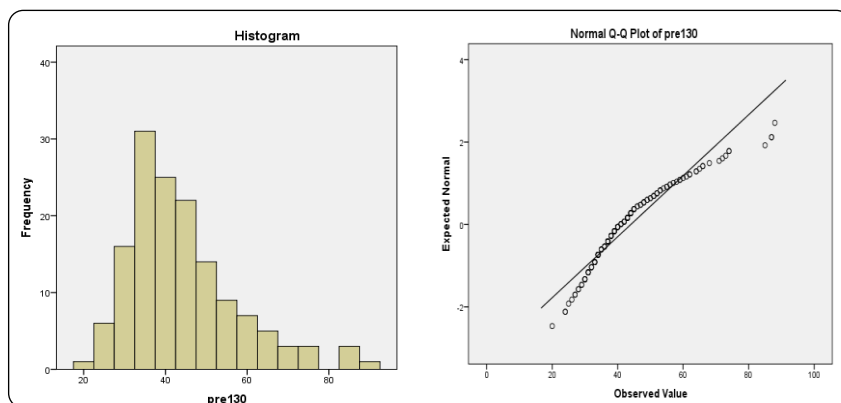


Figure 4.5 Output of the normality check for pre-test scores (all subjects)

Figure 4.5 shows the histogram and normal Q-Q plot for the pre-test scores which seemingly illustrated an approximate distribution. However, the Shapiro-Wilk test indicated that the pre-test scores were not normally distributed, $D(146) = .914$, $p < .001$. To analyse the difference in pre-test scores between the two groups, an independent-samples t -test was conducted. First, it indicated equal variances, $F = .026$, $p = .871$. The t -test, then, revealed that the pre-test scores, between the groups, were significantly different, $t(144) = 1.980$, $p = .049$, $d = -0.35$. The effect size ($d = -0.35$) also indicated that the control group did better on the pre-test.

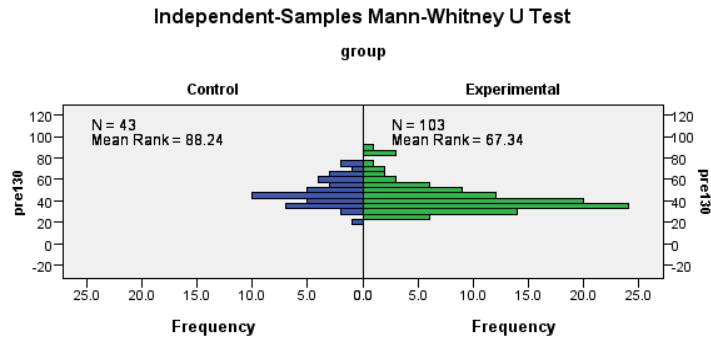


Figure 4.6 Mann-Whitney U test of pre-test scores

According to Figure 4.6, the Mann-Whitney U test indicated that pre-test scores were significantly different between the experimental group ($Mdn = 39$), and the control group ($Mdn = 45$), $U = 1580.5$, $p = .006$, $r = -0.23$. Hence, participants' pre-test scores on the control group were higher than the experimental group. In other words, the participants from the control group were likely to have greater pre-existing vocabulary knowledge than the other group.

Post-test scores

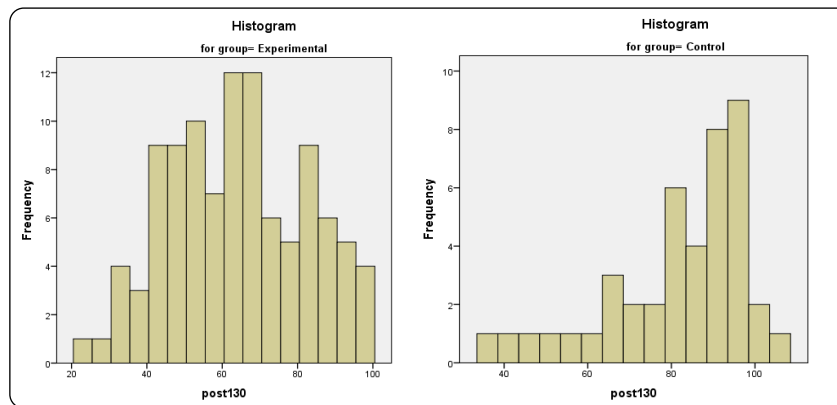


Figure 4.7 Post-test scores of students between the experimental and control groups

Figure 4.7 shows the participants' post-test scores (experimental: $M = 63.91$, $SD = 18.13$; control: $M = 81.95$, $SD = 16.74$). To explore the distribution of the post-test scores, a normality check was conducted, as the output shown in Figure 4.8.

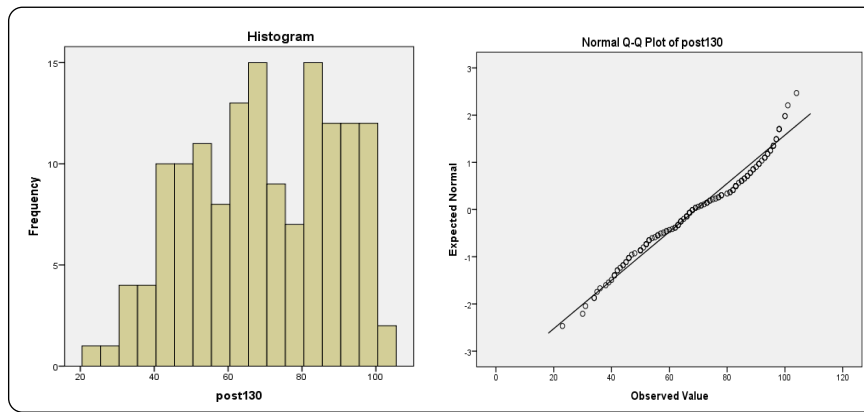


Figure 4.8 Output of the normality check for post-test scores (all subjects)

As the normal Q-Q plot for the post-test scores shown in Figure 4.8, overall the total scores had approximately normal distribution. However, the Shapiro-Wilk test indicated that the post-test scores were not normally distributed, $D(146) = .967$, $p = .001$. An independent-samples t -test was also conducted to examine the difference in the post-test scores, and it indicated equal variances, $F = 1.004$, $p = .318$. Then, the t -test found the scores, between the groups, were significantly different [$t(144) = 5.603$, $p < .001$, $d = -1.02$]. The effect size ($d = -1.02$) indicated the control group outperformed the other group by a sizable margin, suggesting that the teaching method had great influence on their increasing vocabulary knowledge.

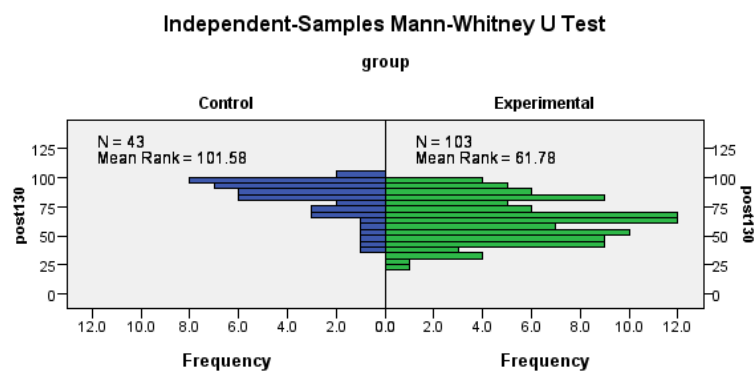


Figure 4.9 Mann-Whitney U test of post-test scores

The independent-samples t -test and the Mann-Whitney U test found a similar result of a statistically significant difference in the participants' post-test. As shown in Figure 4.9, the test indicated that the post-test scores were also significantly different between the experimental group ($Mdn = 64$) and control group ($Mdn = 87$), $U = 1007$, $p < .001$, $r = -0.43$. However,

as students had significantly different pre-test scores, ANCOVA was additionally conducted to explore whether a similar significant difference existed.

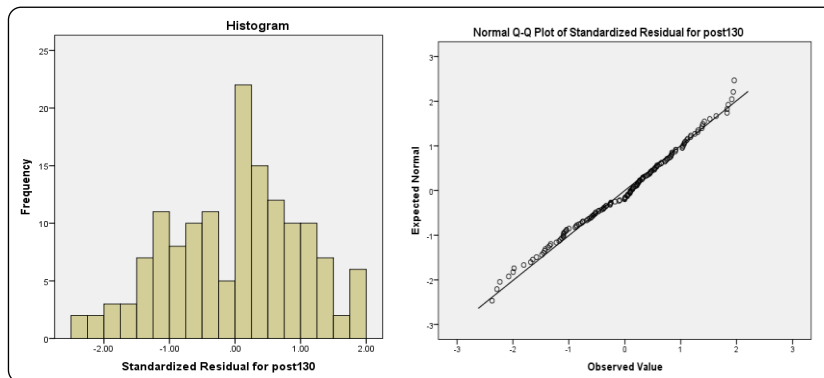


Figure 4.10 Standardised residual for post-test scores

As shown in Figure 4.10, the residuals were normally distributed, that is, the Shapiro-Wilk test indicated the normal distribution of standardised post-test scores, $D(146) = .985$, $p = .126$. After conducting ANCOVA, Levene's test from the analysis indicated equal variances, $F(1,144)=1.618$, $p = .205$. It revealed no main effects of pre-test, that is, the predicted main effect of pre-test was not significant, $F(1,143) = 1.728$, $p = .191$, $\eta_p^2 = .012$. Furthermore, the control group's post-test scores were greater than the participants' from the experimental group as the post-test scores between the groups found to be significantly different, $F(1,143) = 28.387$, $p < .001$, $\eta_p^2 = .166$. The partial eta squared ($\eta_p^2 = .166$) was around 17% which was a small effect for the practical significance, related students' increasing vocabulary knowledge to the teaching methods. Based on the mean scores, the ANCOVA results probably indicated that the participants from the control group were likely to have greater vocabulary knowledge. Moreover, comparing the estimated marginal means, it was found that the control group ($M = 81.46$) outperformed the other group ($M = 64.12$).

Gain scores: Pre-test - Post-test

To find if the treatment main effect was significant, the analysis of gain scores was conducted to look at the change from pre-test to post-test. The participants' gain scores of pre-test - post-test (pre-post) (experimental: $M = 21.30$, $SD = 22.75$; control: $M = 34.53$, $SD = 16.011$). Moreover, an

independent-samples *t*-test revealed that the gain scores (pre-post), between the two groups, were significantly different, $t(144) = 3.469$, $p < .001$, $d = -0.63$. As can be seen, the effect size ($d = -0.63$) also indicated that the participants in the control group benefitted in terms of practical significance regarding their improvement in vocabulary knowledge, compared with the experimental group. Based on the mean scores, the subjects from the control group had higher post-test scores than the experimental group, and they tended to have experienced greater change in vocabulary knowledge during the course.

To conclude, the subjects from the experimental and control groups were different in their pre-test scores or pre-existing vocabulary knowledge. The control group outperformed the other group in the post-test scores and saw greater gain in their vocabulary knowledge. See summary of findings related to RQ1 in Appendix 16.

Research question 2

RQ2: To what extent do students retain their vocabulary knowledge?

Based on the second research question, we will examine the participants' retention of their vocabulary knowledge during the course and one month after the course ended. The results derived from the delayed test and gain scores derived from the change in scores between the pre-test to delayed test and between the post-test to delayed test, as described in the following sections.

Delayed test

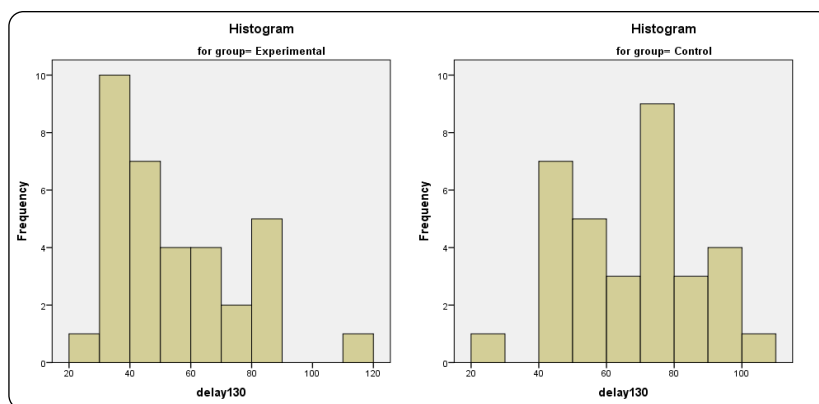


Figure 4.11 Delayed test scores between the experimental and control groups

Figure 4.11 shows the delayed test scores between the experimental and control groups. The delayed test was administered one month after the course ended. Students from both groups were asked for extra participation in this test. In total, 34 participants from the experimental group ($M = 54.29$, $SD = 20.69$) and 33 participants from the control group ($M = 67.42$, $SD = 19.01$) voluntarily took part in the test. To explore whether the statistical assumptions were met, equality of variances and a normality check were also conducted. Figure 4.12 shows the output, from the normality test, of the delayed post-test scores of all participants.

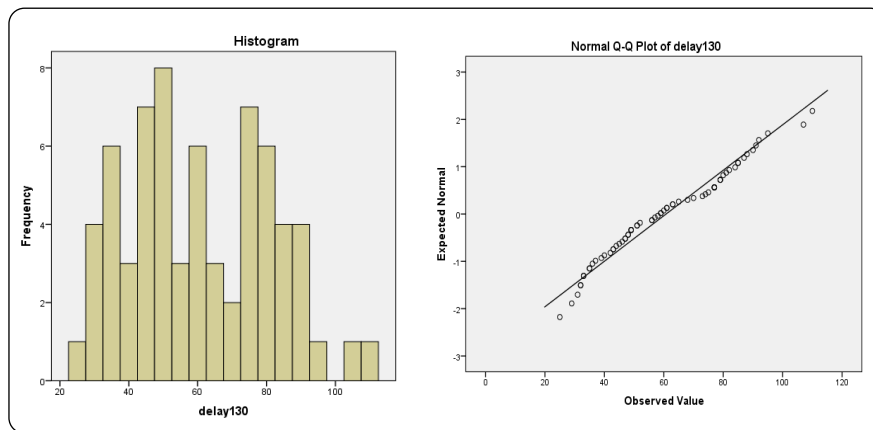


Figure 4.12 Output of the normality check for delayed test scores

The Shapiro-Wilk test revealed that the participants' delayed test scores were not normally distributed, $D(67) = .964$, $p = .052$. Furthermore, an independent-samples t -test indicated equal variances ($F = .155$, $p = .695$). Hence, with equal variances and a normal distribution, this assumption was met. The t -test revealed a statistically significant difference in the delayed test scores between the two groups, $t(65) = 2.703$, $p = .009$, $d = -0.66$. The effect size ($d = -0.66$) also indicated that the teaching method within the control group probably had more practical significance in terms of their improvement compared with the experimental group.

However, as revealed in RQ1 that pre-test scores between the two groups were different, so ANCOVA was subsequently conducted. To explore if the assumptions were met for ANCOVA, equality of variances and normality checks were carried out and the assumptions were met.

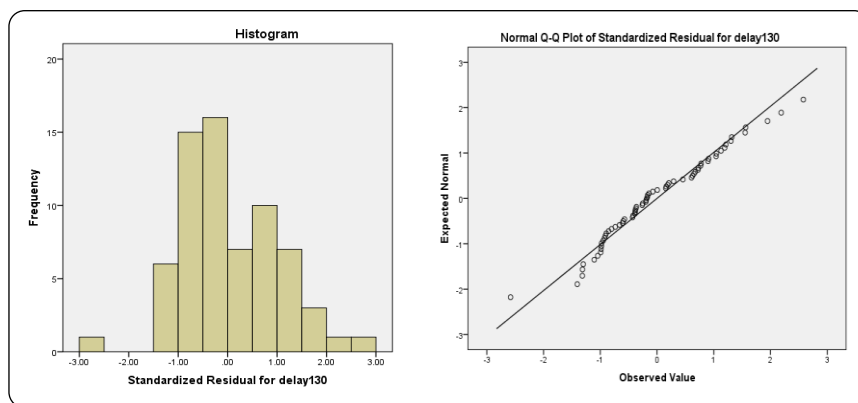


Figure 4.13 Standardised residual for delayed test scores (all participants)

As shown in Figure 4.13, the standardised residuals were normally distributed, indicated by the Shapiro-Wilk test, $D(67) = .976$, $p = .209$. Levene's test in ANCOVA indicated equal variances, $F(1,65) = .053$, $p = .818$. Furthermore, the analysis indicated the main effects of the pre-test. It showed that the predicted main effect of the pre-test was significant, $F(1,64) = 31.345$, $p < .001$, $\eta_p^2 = .329$. Furthermore, the delayed test scores between the groups indicated no significantly difference, $F(1,64) = 1.216$, $p = .274$, $\eta_p^2 = .019$. The estimated size of the impact of the teaching method (partial eta squared: $\eta_p^2 = .019$) was low, around 1.9%, which indicated that there was no practical significance in their vocabulary knowledge retention regarding the teaching method. Moreover, the participants between two groups did not make much difference or outperform one another in the delayed test once the pre-test was taken into account. Moreover, a reliability analysis was additionally carried out for the delayed test to check the level of consistency that the participants' responses had on the test. Cronbach's Alpha showed low reliability, $r = .232$, which indicated that guessing probably took an important part in their test-taking. Consequently, this affected the validity in assessing the differences in the delayed test scores, between the two groups.

Gain scores: 'pre-test - delayed test' and 'post-test - delayed test'

To find out whether the change in students' vocabulary knowledge retention was affected by the treatment, gain scores derived from the change in scores between the pre-test to delayed test and between the

post-test to delayed test were analysed. The gain scores were obtained from the experimental group (N = 34) and the control group (N = 33), with descriptive statistics as follows:

- **Pre-test - delayed test:** Experimental group: $M = 14.32$, $SD = 15.58$;
Control group: $M = 19.36$, $SD = 16.98$

- **Post-test - delayed test:** Experimental group: $M = -20.79$, $SD = 13.15$;
Control group: $M = -14.97$, $SD = 14.29$

An independent-samples t -test indicated that their gain scores of 'pre-test - delayed test' were not significantly different, $t(65) = 1.27$, $p = .210$, $d = -0.31$. Similarly, the gain scores of 'post-test - delayed test' revealed no significant difference, $t(65) = 1.74$, $p = .087$, $d = -0.42$. Between the two groups, they retained their vocabulary knowledge at a similar level from the beginning of the course to after the course ended. However, based on the mean gain scores, the control group was likely to obtain slightly greater change than the experimental group, and the effect size values ($d = -0.31$; -0.42) indicated that the teaching methods within the control group had a small effect in terms of practical significance with regard to the change in their vocabulary knowledge retention.

To sum up, with a significant difference in the pre-test mentioned in RQ1, the control group had higher vocabulary knowledge at the beginning. However, the change and rate of their vocabulary knowledge retention may not be different. That is, during the course, both groups retained their vocabulary knowledge at a similar level, and their vocabulary knowledge decreased one month after the course ended. See summary of findings related to RQ2 in Appendix 17.

Research question 3

RQ3: Are male students' test scores different from female students'?

This section examines the difference of test scores between male and female students within each group, in terms of English language proficiency, pre-existing knowledge, increasing vocabulary knowledge, and vocabulary knowledge retention. The results derived from PET, pre-test, post-test, delayed test, and gain scores (pre-post, pre-delay, post-delay). They are reported into the following parts based on the test scores within each group.

PET scores: Experimental group

To perceive the participants' English language proficiency, participants from both groups took PET in the first week of the course. Figure 4.14 presents male and female students' PET scores from the experimental group.

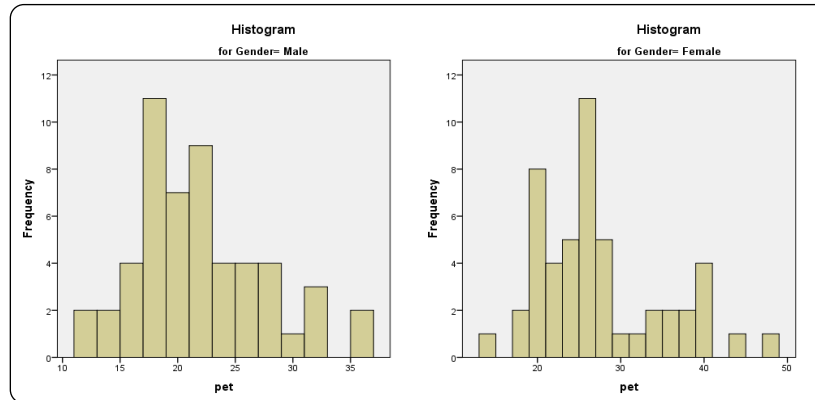


Figure 4.14 PET scores between male and female students (Experimental group)

Shown in Figure 4.14, PET scores were derived from the participants within the experimental group, with 53 male students ($M = 21.43$, $SD = 5.48$), and 50 female students ($M = 26.96$, $SD = 7.58$). A normality check was conducted to explore the score distribution. Figure 4.15 shows the output from the test of normality.

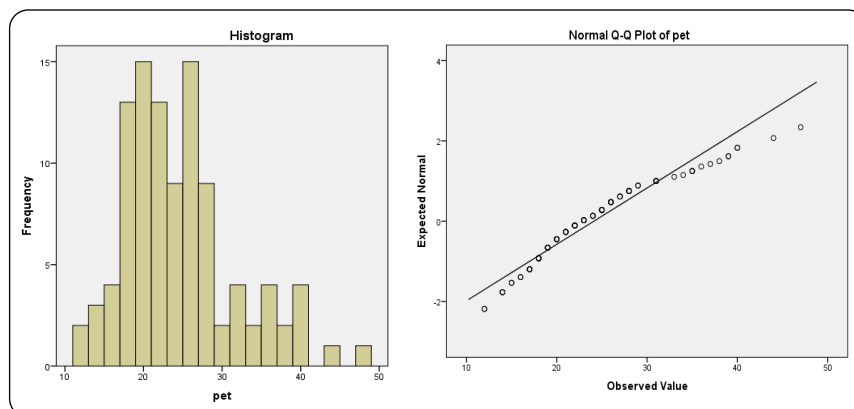


Figure 4.15 Output of the normality check for PET scores of all male and female students (Experimental group)

Based on the normality check, the normal Q-Q plot shows the approximate score distribution. However, the Shapiro-Wilk test revealed that the participants' delayed test scores were not normally distributed, $D(103) = .938$, $p < .001$. Furthermore, an independent-samples t -test was conducted and found unequal variances, $F = 4.009$, $p = .048$. The t -test also indicated

that PET scores between the two groups were different, $t(101) = 4.26$, $p < .001$, $d = -0.84$. With unequal variances and a non-normal distribution of scores, the Mann-Whitney U test as shown in Figure 4.16, was used to examine whether similar results occurred.

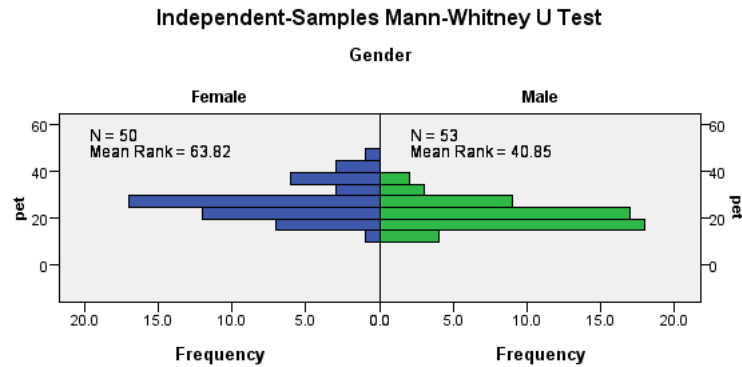


Figure 4.16 Mann-Whitney U test of PET scores between male and female students (Experimental group)

The Mann-Whitney U test indicated the same significant difference in PET scores between the two genders. In other words, PET scores were greater for female students ($Mdn = 25$) than male students ($Mdn = 21$), $U = 734$, $p < .001$, $r = -0.38$. It can be seen that, within the experimental group, female students' English language proficiency was likely to be higher than male students.

PET scores: Control group

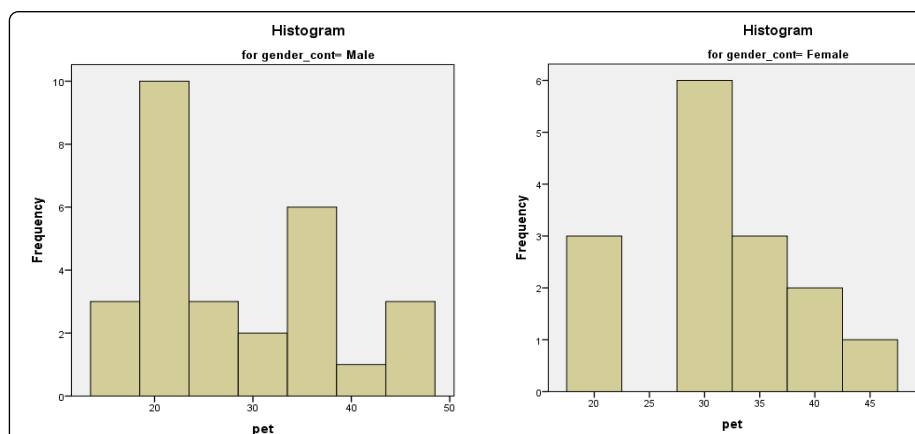


Figure 4.17 PET scores between male and female students (Control group)

Figure 4.17 shows PET scores between male and female students from the control group. There were 28 male students ($M = 28.07$, $SD = 9.72$), and 15 female students ($M = 31.87$, $SD = 7.36$). A normality check was then conducted to explore the score distribution which was shown in Figure 4.18.

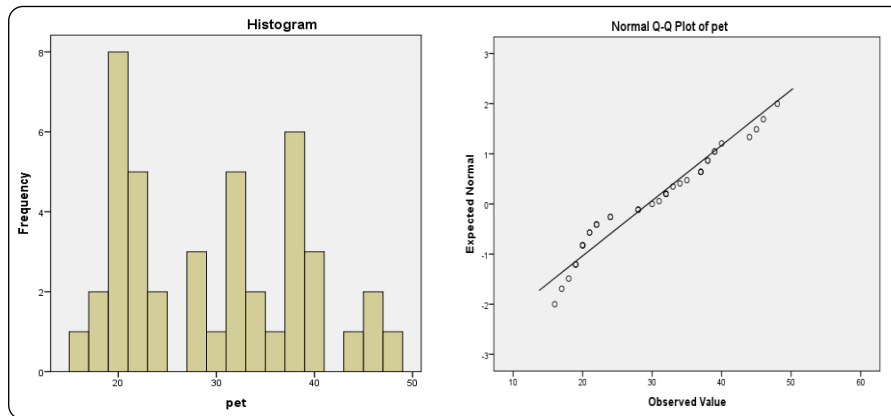


Figure 4.18 Output of the normality check for PET scores of all male and female students (Control group)

As the approximate score distribution shown in Figure 4.18, the Shapiro-Wilk test revealed that the participants' PET scores was not normally distributed, $D(43) = .933$, $p = .014$. Analysed by an independent-samples t -test, unequal variances ($F = 4.82$, $p = .034$) was found, and PET scores between the two genders were not significantly different, $t(41) = 1.321$, $p = .160$, $d = -0.42$. Therefore, with unequal variances and non-normal distribution of scores, the Mann-Whitney U test (Figure 4.19), was employed to examine the additional results run by the independent-samples t -test.

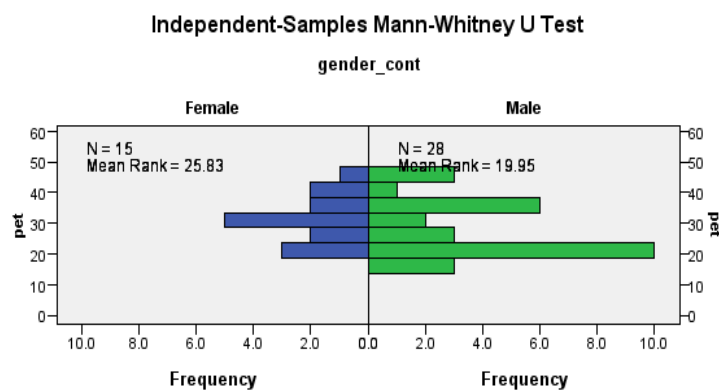


Figure 4.19 Mann-Whitney U test of PET scores between male and female students (Control group)

The Mann-Whitney U test similarly indicated no significant difference in PET scores between the two genders. That is, in the control group, language proficiency was not different, statistically speaking, between female students ($Mdn = 32$) and male students ($Mdn = 24$), $U = 152.5$, $p = .142$, $r = -0.22$. They tended to have a similar level of English language proficiency.

Pre-test scores: Experimental group

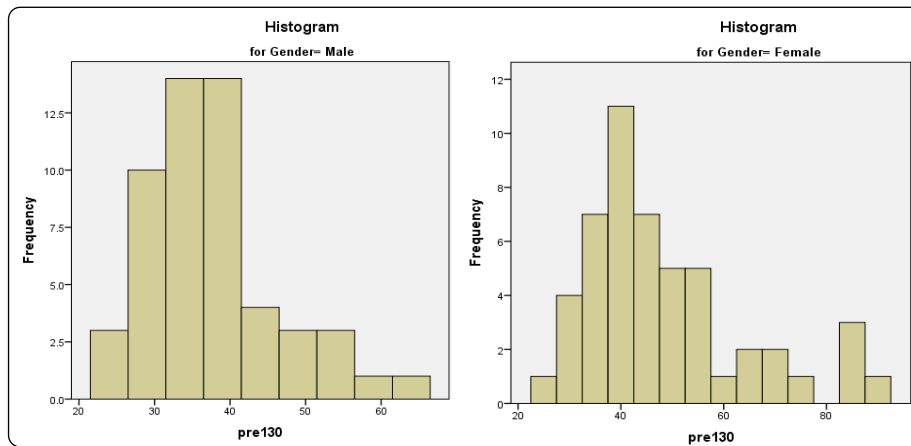


Figure 4.20 Pre-test scores between male and female students (Experimental group)

Figure 4.20 shows pre-test scores between male and female students from the experimental group. There were 53 male students ($M = 37.49$, $SD = 8.52$) and 50 female students ($M = 48.04$, $SD = 16.01$). To examine the score distribution, a normality check was then conducted, and the output from test of normality is presented in Figure 4.21.

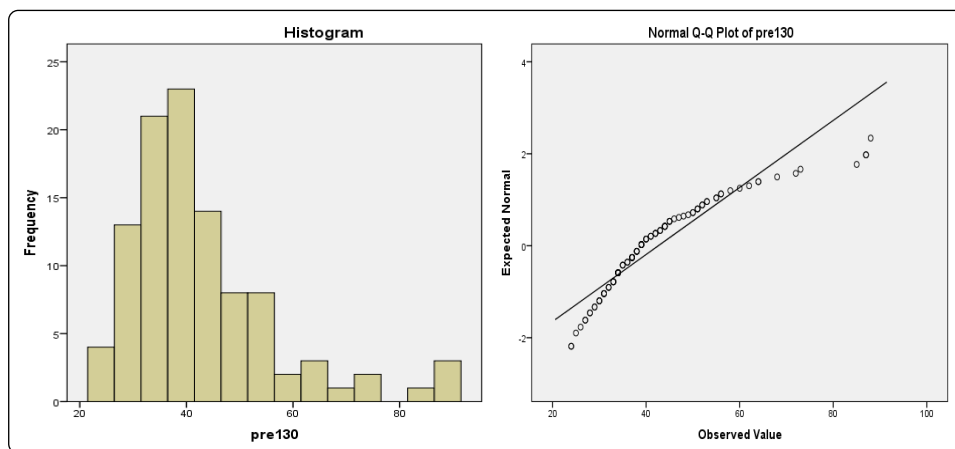


Figure 4.21 Output of the normality check for pre-test scores of all male and female students (Experimental group)

As the output illustrated in Figure 4.21, the distribution was likely to be skewed. The Shapiro-Wilk test revealed that the participants' pre-test scores were not normally distributed, $D(103) = .864$, $p < .001$. Analysed by an independent-samples t -test, unequal variances ($F = 14.69$, $p < .001$) occurred, and the t -test revealed that the pre-test scores between the two genders were significantly different, $t(101) = 4.21$, $p < .001$, $d = -0.83$.

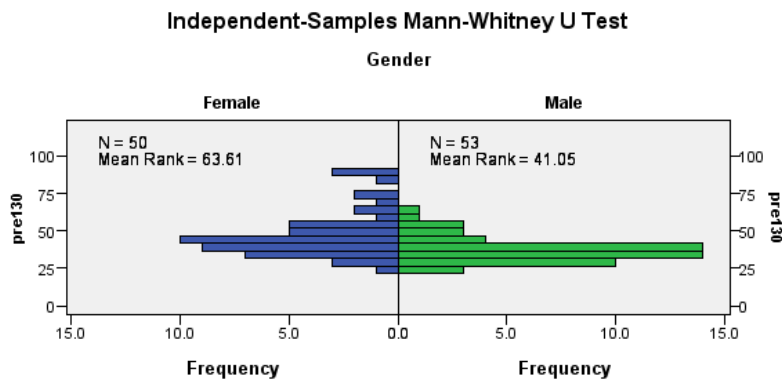


Figure 4.22 Mann-Whitney U test of pre-test scores between male and female students (Experimental group)

The Mann-Whitney U test (Figure 4.22) confirmed that the pre-test scores between the two genders were significantly different or greater for female students ($Mdn = 43.5$) than male students ($Mdn = 36$), $U = 744.5$, $p < .001$, $r = -0.38$. Female students tended to have greater pre-existing vocabulary knowledge than male students.

Pre-test scores: Control group

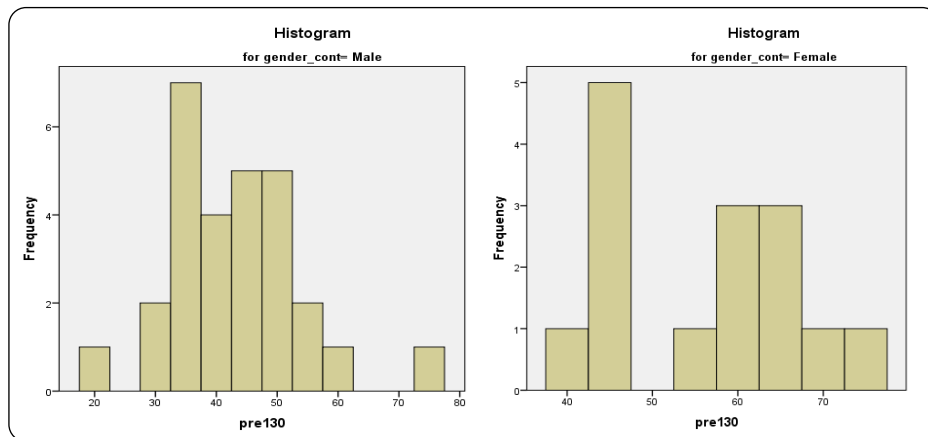


Figure 4.23 Pre-test scores between male and female students (Control group)

According to Figure 4.23, based on the analysed pre-test scores, there were 28 males students ($M = 42.75$, $SD = 10.53$) and 15 female students ($M = 56.13$, $SD = 11.34$), within the control group. To additionally check if the assumptions were met, the test of normality was conducted, and the output of score distribution is shown in Figure 4.24.

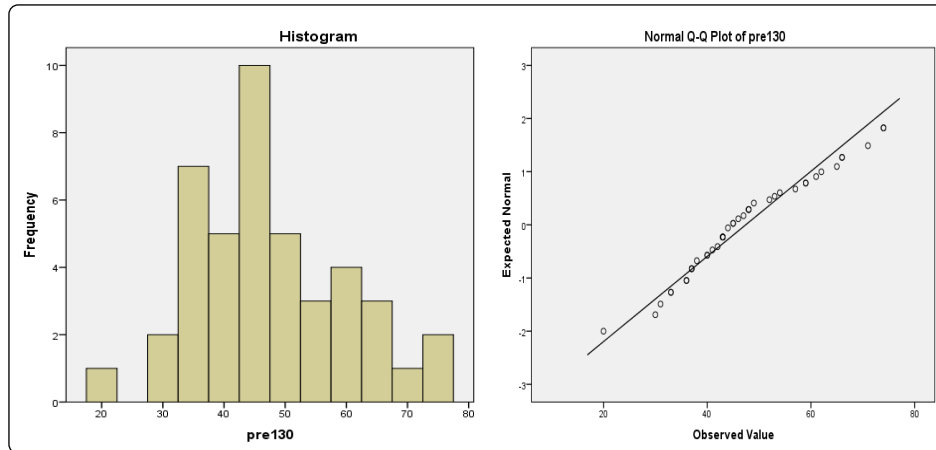


Figure 4.24 Output of the normality check for pre-test scores of all male and female students (Control group)

From Figure 4.24, after the normality check was conducted, the normal Q-Q plot shows an approximately normal score distribution. Likewise, the Shapiro-Wilk test revealed that the participants' pre-test scores, from the control group, were normally distributed, $D(43) = .963$, $p = .172$. Moreover, analysed by an independent-samples t -test, Levene's test revealed equal variances, $F = 1.301$, $p = .261$. Therefore, with equality of variances and a normal distribution of scores, the independent-samples t -test was employed to indicate whether there is a significant difference in the pre-test scores. The results showed that, between the two genders, their pre-test scores were significantly different, $t(41) = 3.87$, $p < .001$, $d = -1.24$. It can be seen that, similarly to the experimental group, female students in the control group had greater pre-existing vocabulary knowledge than male students.

Post-test scores: Experimental group

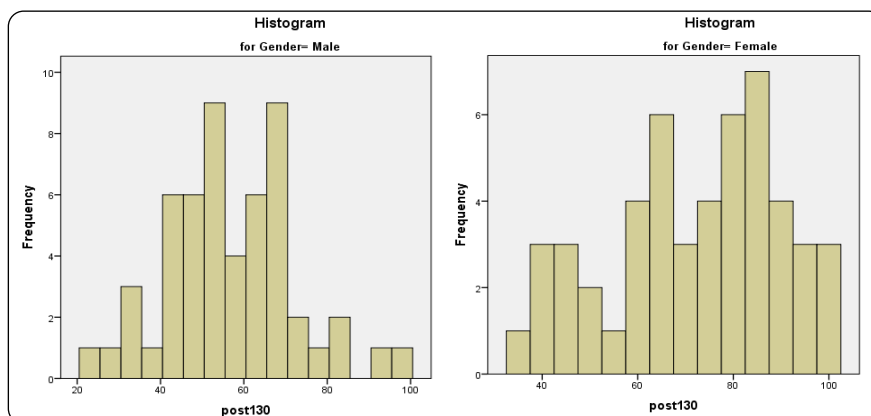


Figure 4.25 Post-test scores between male and female students (Experimental group)

Figure 4.25 shows the post-test scores between male and female students from the experimental group. There were 53 males students ($M = 56.62$, $SD = 15.38$) and 50 female students ($M = 71.64$, $SD = 17.74$). To explore the distribution of scores, the test of normality revealed the output of distributed scores is shown in Figure 4.26.

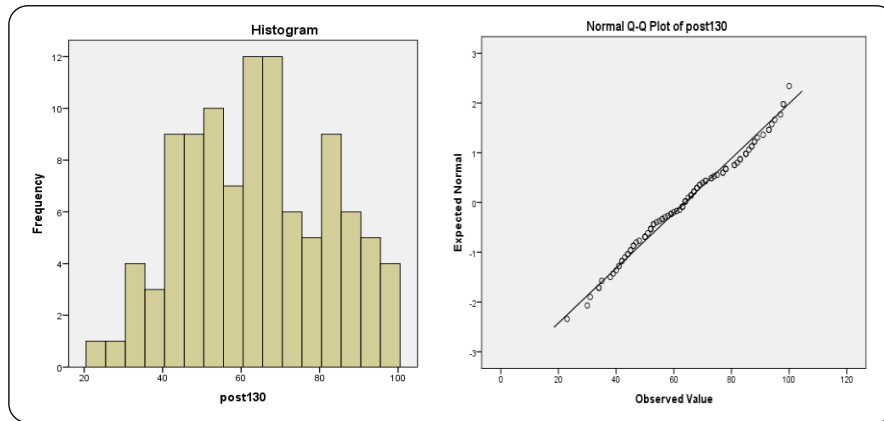


Figure 4.26 Output of the normality check for post-test scores of all male and female students (Experimental group)

From Figure 4.26, it shows the approximately normal score distribution obtained from the normality check. The Shapiro-Wilk test also revealed that the participants' post test scores was normally distributed, $D(103) = .981$, $p = .158$. As conducted by an independent-samples t -test, equal variances ($F = 2.28$, $p = .134$) were found. It also revealed that the post-test scores between the two genders were significantly different, $t(101) = 4.59$, $p < .001$, $d = -0.91$. Female students outperformed male students in increasing vocabulary knowledge, and the effect size ($d = -0.91$) indicated a larger effect of the teaching methods on female than male students.

However, with significantly different pre-test scores between the two genders and to look into the results of significant difference in post-test scores, ANCOVA was conducted to compare the post-test scores between male and female students from the experimental group, while controlling for the pre-test as covariate. To explore whether the ANCOVA assumptions were met, Levene's test revealed equality of variances, $F(1,101) = 1.78$, $p = .185$. Furthermore, as shown in Figure 4.27, the Shapiro-Wilk test revealed that the studentized residuals were normally distributed, $D(103) = .992$, $p = .794$.

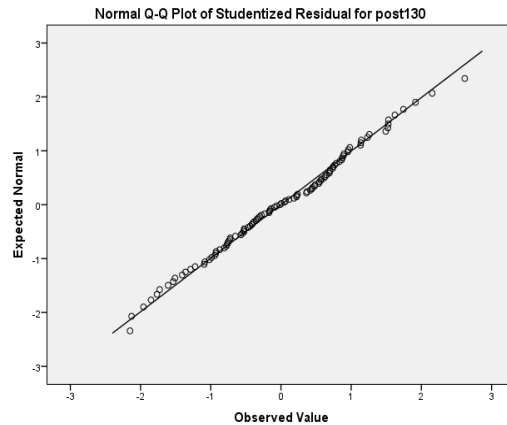


Figure 4.27 Studentized residual for post-test scores of all male and female students (Experimental group)

After checking that the assumptions were met, the ANCOVA results revealed that the pre-test had no main effect on the dependent variable, $F(1,100) = 3.89$, $p = .051$, $\eta_p^2 = .038$. Moreover, there was a significant difference in mean post-test scores, $F(1,100) = 25.65$, $p < .001$, $\eta_p^2 = .204$. As can be seen, female students gained higher post-test scores or vocabulary knowledge than male students. Comparing the estimated marginal means showed that female students' post-test scores were likely to be greater than the male students', $M = 55.33$ (male), $M = 73.01$ (female). The estimated size of an effect, partial eta squared, ($\eta_p^2 = .204$) was around 20%, that is, the treatment probably had a slight impact on the participants' increasing vocabulary knowledge.

Post-test scores: Control group

According to Figure 4.28, within the control group, there were 28 males students ($M = 78.07$, $SD = 18.52$) and 15 female students ($M = 89.2$, $SD = 9.64$).

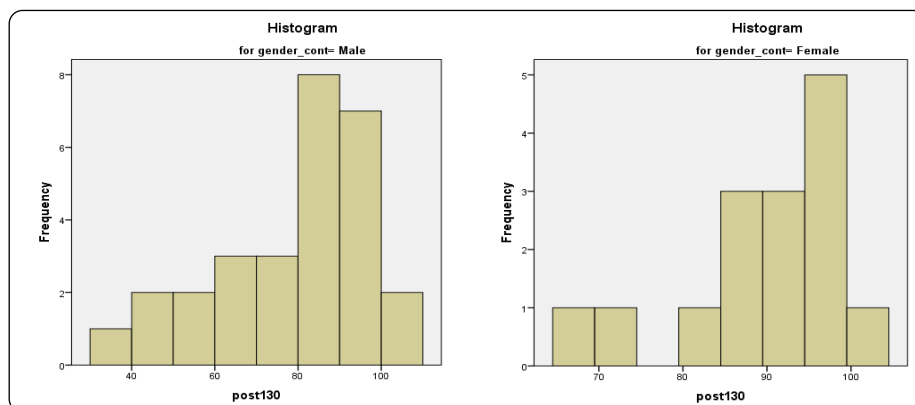


Figure 4.28 Post-test scores between male and female students (Control group)

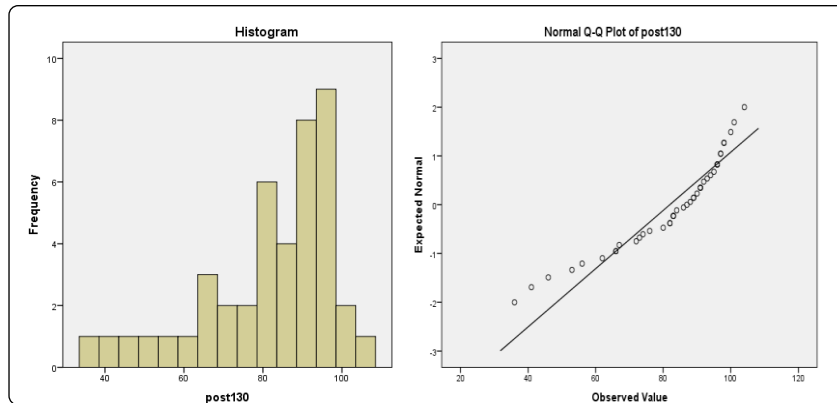


Figure 4.29 Histogram and normal Q-Q plot for post-test scores of all male and female students (Control group)

From Figure 4.29, the normality check illustrates the skewedness of post-test scores. The Shapiro-Wilk test revealed that the participants' post-test scores were not normally distributed, $D(43) = .889$, $p = .001$. With an independent-samples t -test, unequal variances were found ($F = 6.72$, $p = .013$), and post-test scores between the two genders were significantly different, $t(41) = 2.167$, $p = .013$, $d = -0.69$. That is, female students in the control group probably had better vocabulary knowledge than male students. Additionally, the effect size ($d = -0.69$) indicated that the treatment was likely to affect more on female students' improvement.

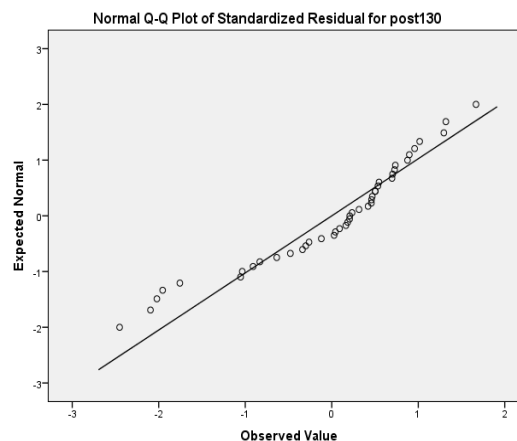


Figure 4.30 Standardised residual for post-test scores of all male and female students (Control group)

With significantly different pre-test scores between the two genders and to look into the results of significant difference in post-test scores, ANCOVA was conducted to compare the post-test scores between male and female students in the control group, while controlling for the pre-test. After being

analysed, Levene's test from ANCOVA revealed equal variances, $F(1,41) = 3.79$, $p = .058$. Moreover, as shown in Figure 4.30, the Shapiro-Wilk test revealed that the standardised residuals were not normally distributed, $D(43) = .928$, $p = .010$.

The ANCOVA output revealed that, as a covariate, the pre-test had a main effect in terms of the dependent variable, $F(1,40) = 4.76$, $p = .035$, $\eta_p^2 = .106$. Moreover, there was no significant difference between male and female students in the control group in mean post-test scores, $F(1,40) = .656$, $p = .423$, $\eta_p^2 = .016$. Partial Eta squared ($\eta_p^2 = .016$) indicated a very small impact (around 1.6%) of the teaching methods. Comparing the estimated marginal means showed that female students' post-test scores were likely to be greater than the male students' scores, $M = 80.33$ (male), $M = 84.98$ (female). However, regarding the analyses from the test of normality and ANCOVA earlier, unequal variances and non-normality of distribution occurred with the post-test scores. Consequently, a Mann-Whitney U test, as shown in Figure 4.31, was conducted to re-examine the results.

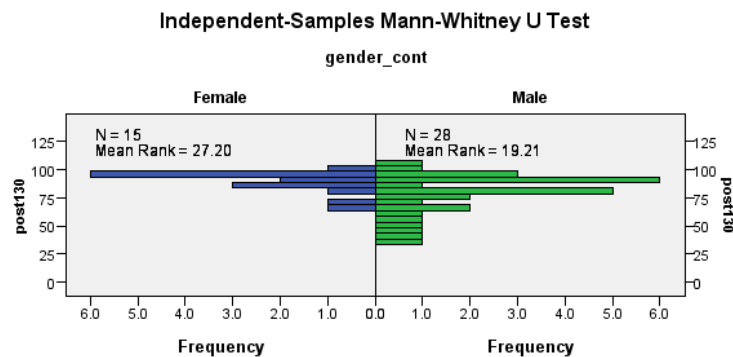


Figure 4.31 Mann-Whitney U test of post-test scores between male and female students (Control group)

Apart from ANCOVA and the independent-samples t -test, the Mann-Whitney U test indicated a similar significant difference of the post-test scores between the two genders, that is, post-test scores were greater for female students ($Mdn = 91$) than male students ($Mdn = 83$), $U = 132$, $p = .047$, $r = -0.3$. It was likely that female students within the control group had greater vocabulary knowledge after learning than male students. Later in the following section, after the course ended, the difference of vocabulary

knowledge retention between the two genders will be examined within each group.

Delayed test scores: Experimental group

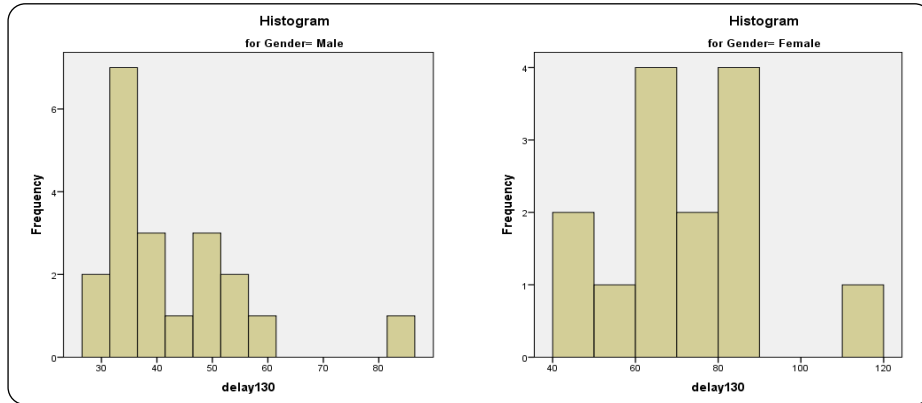


Figure 4.32 Delayed test scores between male and female students (Experimental group)

Figure 4.32 presents the delayed test scores between male and female students from the experimental group. There were 20 male students ($M = 42.5$, $SD = 13.24$) and 14 female students ($M = 71.14$, $SD = 17.63$). A test of normality was also conducted to explore the score distribution, as the output shown in Figure 4.33.

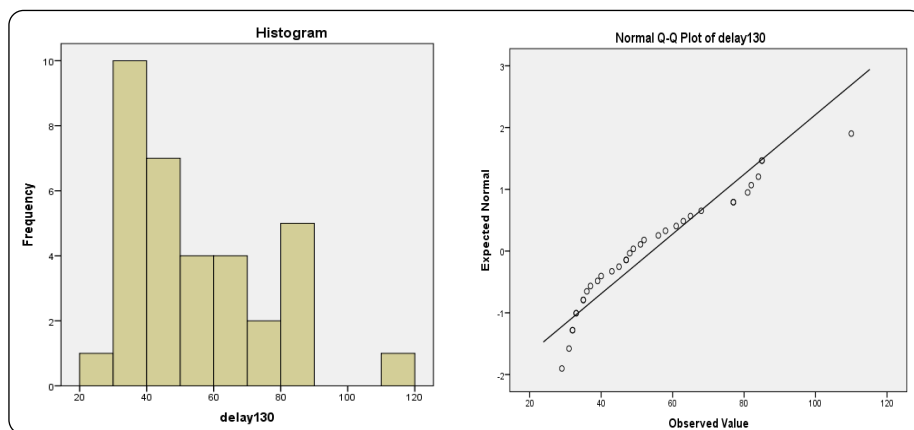


Figure 4.33 Output of a delayed test score distribution of all male and female students (Experimental group)

Figure 4.33 shows the output of the normality check, from which the delayed test scores were found to be skewed. The Shapiro-Wilk test revealed that the participants' delayed test scores were not normally distributed, $D(34) = .91$, $p = .009$. With an independent-samples t -test, Levene's test showed equal variances, $F = 1.72$, $p = .199$). The t -test also revealed that the

delayed test scores between the two genders were significantly different, $t(32) = 5.42$, $p < .001$, $d = -1.89$. Female students from the experimental group outperformed male students in retaining greater vocabulary knowledge. Furthermore, it was more likely that female students were affected by the learning environment, as based on the calculated effect size ($d = -1.89$).

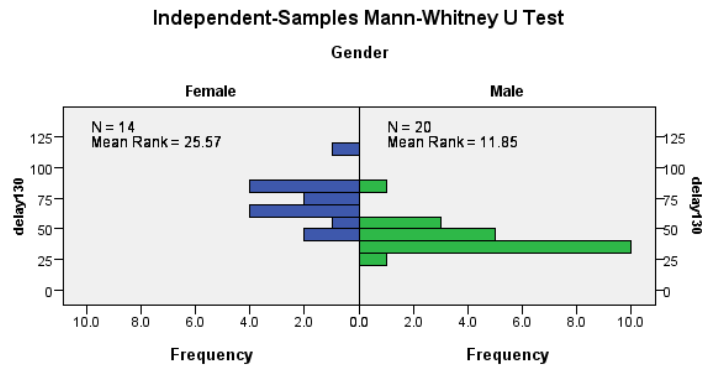


Figure 4.34 Mann-Whitney U test of delayed test scores between male and female students (Experimental group)

Figure 4.34 shows the Mann-Whitney U test of delayed test scores between the two genders from the experimental group. The results indicated a significant difference in the delayed test scores which were greater for female students ($Mdn = 72.5$) than male students ($Mdn = 38$), $U = 27$, $p < .001$, $r = -1.64$. With a significant difference in pre-test scores between the two genders and to look into the results of significant difference in delayed test scores, ANCOVA revealed equal variances from Levene's test, $F(1,32) = .284$, $p = .598$.

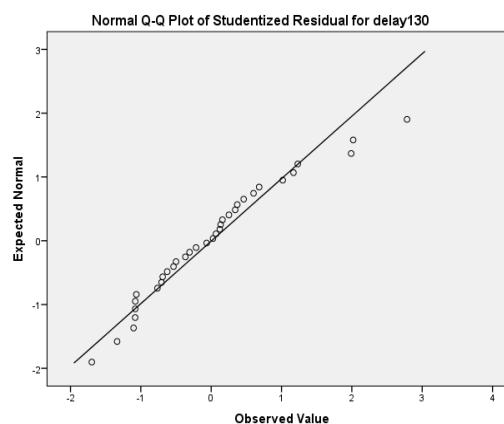


Figure 4.35 Studentized residual for delayed test scores of all male and female students (Experimental group)

From the residual check as shown in Figure 4.35, the Shapiro-Wilk test revealed that the studentized residuals of the delayed test scores were normally distributed, $D(34) = .951$, $p = .129$. Hence, the ANCOVA assumptions were met, with a normal distribution of residuals and equal variance. Moreover, the statistical analysis revealed that, as a covariate, the pre-test had main effects on the dependent variable, $F(1,31) = 14.73$, $p = .001$, $\eta p^2 = .32$. Moreover, there was a significant difference in mean delayed test scores, $F(1,31) = 15.01$, $p = .001$, $\eta p^2 = .33$. The estimated effect size ($\eta p^2 = .33$) indicated that there was around 33% of effect related the instruction to the subjects' vocabulary knowledge retention. In other words, female students tended to perform better on the delayed test than male students. In addition, comparing the estimated marginal means showed that female students' delayed test scores were likely to be greater than the male students', $M = 46.27$ (male), 66.75 (female).

Delayed test scores: Control group

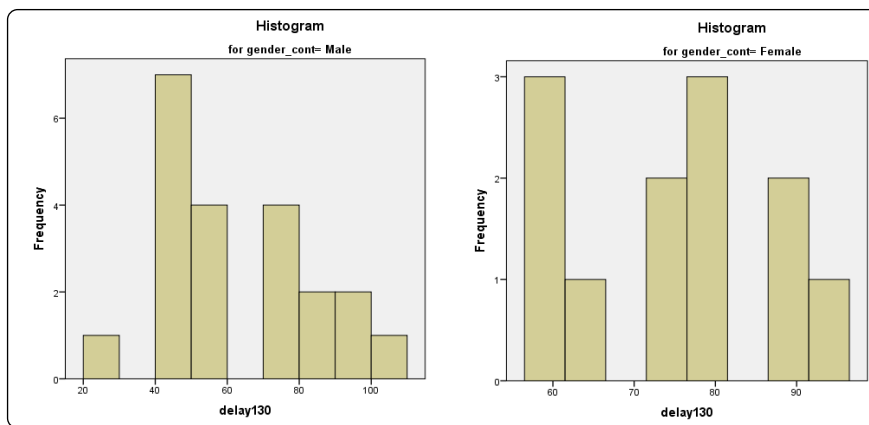


Figure 4.36 Delayed test scores between male and female students (Control group)

According to Figure 4.36, within the control group, there were 21 male students ($M = 63.05$, $SD = 20.94$) and 12 female students ($M = 75.08$, $SD = 12.37$). The score distribution was then checked with the test of normality to explore whether the delayed test scores were normally distributed.

Figure 4.37 shows the histogram and a normal Q-Q plot for the delayed test scores of the two genders which appeared to be an approximately normal distribution. The Shapiro-Wilk test revealed that the participants' delayed test scores was normally distributed, $D(33) = .976$, $p = .675$.

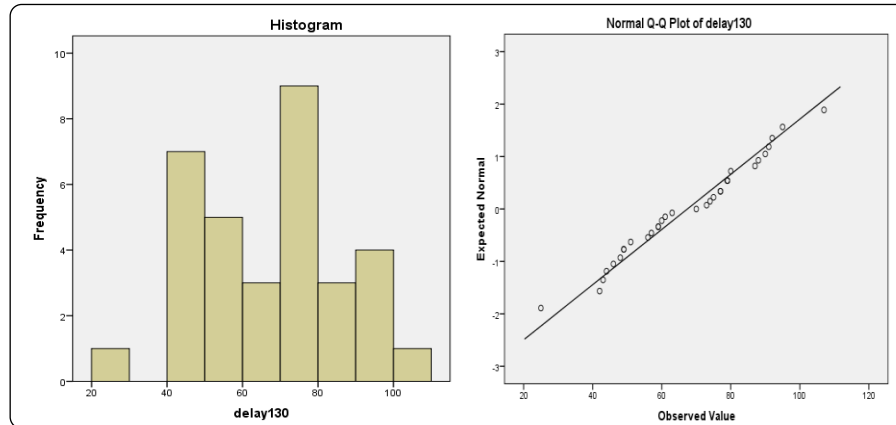


Figure 4.37 Output of a delayed test score distribution of all male and female students (Control group)

With an independent-samples t -test, unequal variances were found, $F = 5.97$, $p = .020$. The t -test also revealed that the delayed test scores between the two genders were significantly different, $t(31) = 1.811$, $p = .046$, $d = -0.66$. That is, female students from the control group had the better rate of vocabulary knowledge retention than male students. The calculated effect size ($d = -0.66$) also indicated that the learning environment seemingly had a larger effect on female than male students.

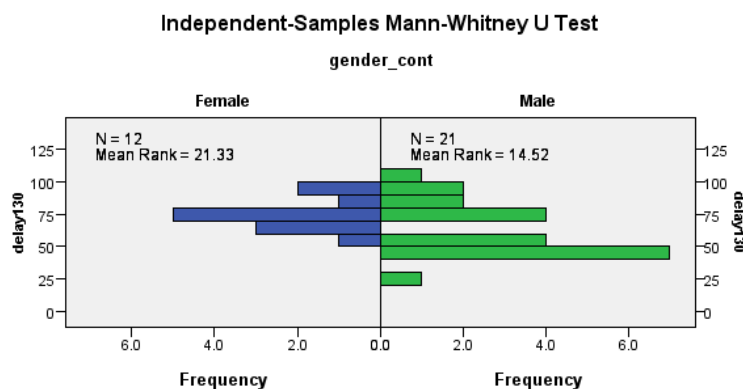


Figure 4.38 Mann-Whitney U test of delayed test scores between male and female students (Control group)

With the unequal variances, all assumptions for a parametric test were not met, as shown in Figure 4.38, the Mann-Whitney U test indicated no

significant difference in the delayed test scores between female students ($Mdn = 76$) and male students ($Mdn = 57$), $U = 74$, $p = .053$, $r = -0.34$.

However, with significantly different pre-test scores between the two genders and to re-examine the results of significant difference in delayed test scores, ANCOVA was conducted. The results indicated that the assumptions met. That is, Levene's test indicated equality of variances, $F(1,33) = 2.94$, $p = .097$. Moreover, as shown in Figure 4.39, the Shapiro-Wilk test revealed that the standardised residual was normally distributed, $D(33) = .975$, $p = .639$.

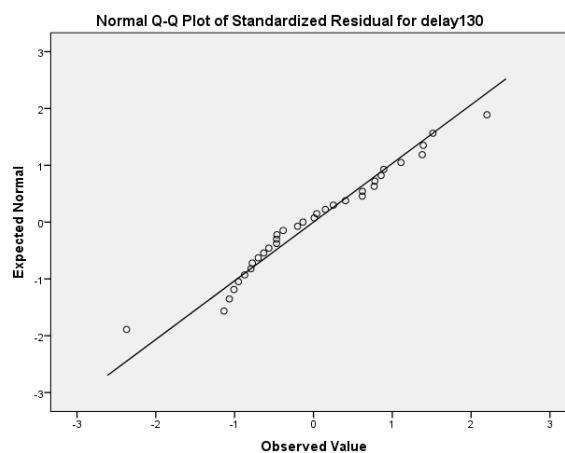


Figure 4.39 Standardised residual for delayed test scores of all male and female students (Control group)

Exploring the delayed test scores, the ANCOVA results revealed that, as a covariate, the pre-test had main effects on the dependent variable, $F(1,30) = 5.53$, $p = .025$, $\eta p^2 = .156$. Moreover, the analysis revealed that both genders were likely to have a similar level of vocabulary knowledge retention, with no significant difference between male and female students in the control group in mean delayed test scores, $F(1,30) = .462$, $p = .502$, $\eta p^2 = .015$. The estimated size of the impact ($\eta p^2 = .015$) indicated that the teaching methods probably had a very small effect (around 1.5%) on students' vocabulary knowledge retention. Comparing the estimated marginal means, the results showed that female students' delayed test scores were likely to be slightly greater than the male students', $M = 65.71$ (male), $M = 70.426$ (female).

Gain scores: pre-test - post-test

To find out whether the change in students' vocabulary knowledge was affected by the treatment, the gain scores were obtained from male and female students in the experimental and control groups, and were analysed with descriptive statistics and an independent-samples *t*-test. The results are shown as follows:

Experimental group

Within the experimental group, the gain scores derived from the change in scores between their pre-test to post-test (pre-post) consisted of 53 male students ($M = 19.13$, $SD = 23.60$) and 50 female students ($M = 23.60$, $SD = 26.45$). Levene's test, analysed by the independent-samples *t*-test, revealed equal variances, $F = 3.884$, $p = .051$. Furthermore, the *t*-test indicated no statistically significant difference in the gain scores (pre-post), $t(101) = .996$, $p = .322$, $d = -0.20$. That is, both genders had a similar level of increasing vocabulary knowledge and learning improvement through the course. The calculated effect size ($d = -0.20$) indicated that the treatment probably had a small effect on female rather than male participants.

Control group

The results derived from the gain scores (pre-post) between male students ($N = 28$, $M = 35.32$, $SD = 16.89$) and female students ($N = 15$, $M = 33.07$, $SD = 14.66$) within the control group. To analyse the difference between the two genders, an independent-samples *t*-test was conducted. Levene's test revealed equal variances ($F = .280$, $p = .600$), and the *t*-test found no statistically significant difference in the gain scores, $t(41) = .436$, $p = .665$, $d = 0.14$. Male and female students within the control group were likely to enhance their vocabulary knowledge and be influenced by the change at a similar level. The calculated effect size ($d = 0.14$) indicated a very small impact of teaching methods more on male than female students.

Gain scores: pre-test - delayed test and post-test - delayed test

Regarding the change in vocabulary knowledge retention, the gain scores from the change in scores between the pre-test to delayed test (pre-delayed) and between the post-test to delayed test (post-delayed) were obtained from male and female students within the experimental and control

groups. The results derived from descriptive statistics and an independent-samples *t*-test are presented into the following:

Experimental group

Within the experimental group, there were 20 male students (pre-delay: $M = 6.45$, $SD = 12.23$; post-delayed: $M = -23.50$, $SD = 12.68$) and 14 female students (pre-delayed: $M = 25.57$, $SD = 12.882$; post-delayed: $M = -16.93$, $SD = 13.29$) who took part in the delayed test one month after the course ended. The independent-samples *t*-test was conducted to indicate whether a significant difference existed. Levene's test revealed equal variances for both gain scores (pre-delayed: $F = .230$, $p = .635$; post-delayed: and the *t*-test found a significant difference in the gain scores (pre-delayed) between the two genders, $t(32) = 4.39$, $p < .001$, $d = -1.53$. However, regarding the gain scores (post-delayed), no significant difference was found between the two genders, $t(32) = 1.46$, $p = .154$, $d = -0.51$. It was likely that, during the course, female students could retain greater vocabulary knowledge than male students. The effect size ($d = -1.53$) on this (pre-delayed) also indicated a much larger effect of the treatment on female students. However, after the course ended, both genders tended to be able to retain vocabulary knowledge at a similar level, and the effect size ($d = -0.51$) revealed a moderate impact of the instruction on female rather than male students.

Control group

The results, within the control group, were derived from 21 male students (pre-delayed: $M = 18.95$, $SD = 18.53$; post-delayed $M = -15.90$, $SD = 16.09$) and 12 female students (pre-delayed: $M = 20.08$, $SD = 14.61$; post-delayed: $M = -13.33$, $SD = 10.89$). As the difference analysed by an independent-samples *t*-test, Levene's test revealed equal variances for both gain scores (pre-delayed: $F = .763$, $p = .389$; post-delayed: $F = 1.135$, $p = .295$). Furthermore, the output showed that there was no statistically significant difference in the two gain scores (pre-delayed: $t(31) = .181$, $p = .857$, $d = -0.07$; post-delayed: $t(31) = .491$, $p = .627$, $d = -0.18$). It was likely that female students retained their vocabulary knowledge, during the course and one month after the course ended, similar to male students. The effect size

(pre-delayed: $d = -0.07$; post-delayed: $d = -0.18$) indicated a very small impact of the teaching methods on female students' improvement.

To conclude, in the experimental group, male and female students showed a significant difference in English language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge, and the knowledge retention. Female students performed better and gained greater change in vocabulary knowledge and in retaining it during the course. However, the two genders tended to have a similar rate of vocabulary knowledge retention after the course ended. In the control group, male and female students particularly had a significant difference in their pre-existing vocabulary knowledge or pre-test. The two genders, however, had no significant difference in terms of English language proficiency, increasing vocabulary knowledge, and knowledge retention. They tended to have approximate change in vocabulary knowledge and retained it during and after the course ended. From both genders, it was more likely the learning environment had a small effect on female rather than male students. Summary of all results and statistical output related to RQ3 is presented in Appendix 18.

Research question 4

RQ4: Are engineering major students' test scores different from architecture major students'?

Between the registered classes in this English language course, there were two different majors, engineering and architecture. Hence, regarding this research question, we aimed to look into whether test scores were different between these two majors from the experimental group who were exposed to the blended learning environment.

PET scores

Figure 4.40 presents PET scores between the two majors, from the experimental group, with 56 engineering major students ($M = 23.96$, $SD = 7.39$), and 47 architecture major students ($M = 24.30$, $SD = 6.85$).

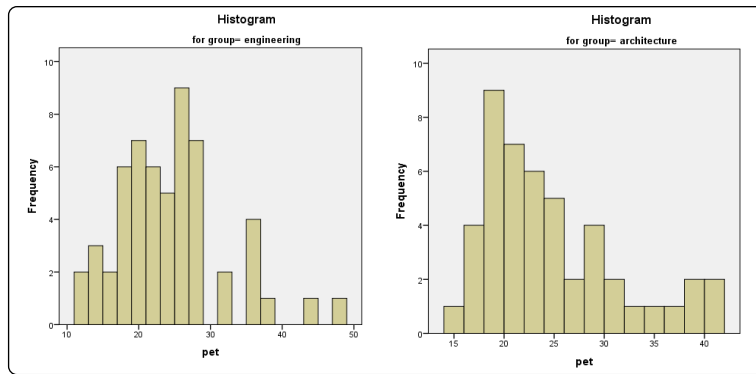


Figure 4.40 PET scores of engineering and architecture students

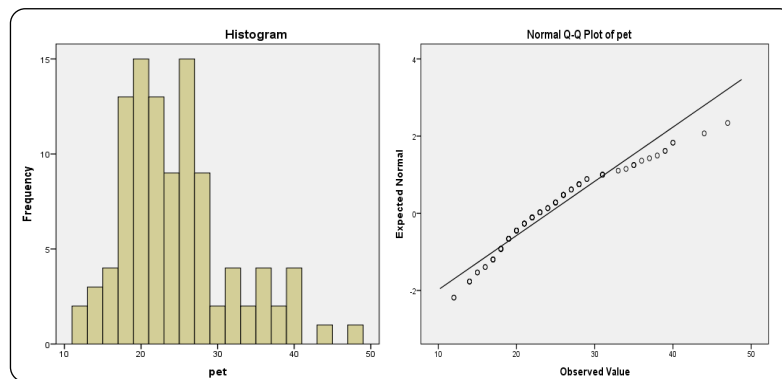


Figure 4.41 Output of a PET score distribution of the two majors

Figure 4.41 shows the output derived from the normality check which generated an approximate score distribution. The Shapiro-Wilk test revealed that the participants' PET scores were not normally distributed, $D(103) = .938$, $p < .001$. Analysed by an independent-samples t -test, equal variances were found, $F = .016$, $p = .901$. It also revealed that PET scores between the two majors were not significantly different, $t(101) = .236$, $p = .814$, $d = -0.05$. Therefore, with unequal variances and a non-normal distribution of scores, the Mann-Whitney U test, as shown in Figure 4.42, was conducted to re-examine the results.

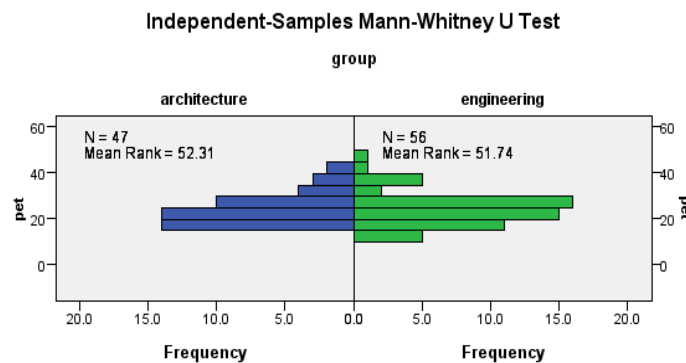


Figure 4.42 Mann-Whitney U test of PET scores between the two majors

Apart from the independent-samples *t*-test, the Mann-Whitney U test also indicated no statistically significant difference in PET scores between engineering (*Mdn* = 23.5) and architecture (*Mdn* = 22) students, $U = 1301.5$, $p = .923$, $r = -0.009$. That is, their English language proficiency was at a similar level.

Pre-test scores

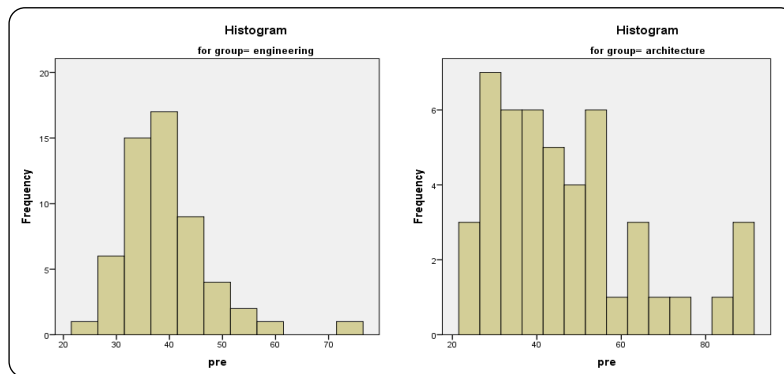


Figure 4.43 Pre-test scores of engineering and architecture students

Figure 4.43 shows pre-test vocabulary scores between the two majors from the experimental group, with 56 engineering students ($M = 39.38$, $SD = 8.51$), and 47 architecture students ($M = 46.47$, $SD = 17.39$).

The output in Figure 4.44 shows the skewedness of score distribution, the Shapiro-Wilk test revealed that the participants' pre-test scores were not normally distributed, $D(103) = .864$, $p < .001$. Analysed by an independent-samples *t*-test, unequal variances were found, $F = 23.03$, $p < .001$. The *t*-test also revealed that pre-test scores between the two majors were significantly different, $t(101) = 2.69$, $p = .013$, $d = -0.53$.

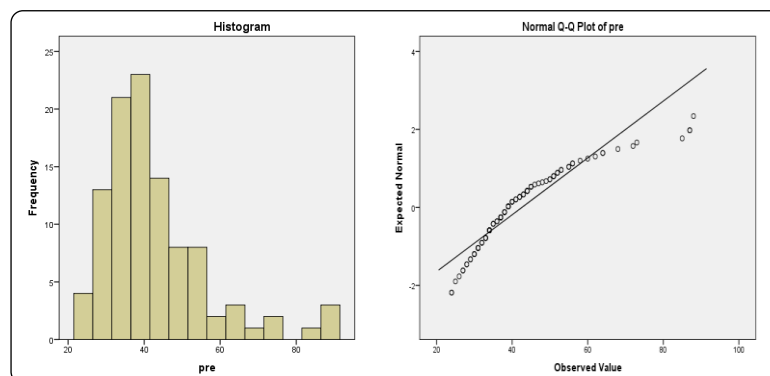


Figure 4.44 Output of a pre-test score distribution of the two majors

As shown from the output, architecture students performed better in the pre-test and had greater pre-existing vocabulary knowledge than the engineering major students.

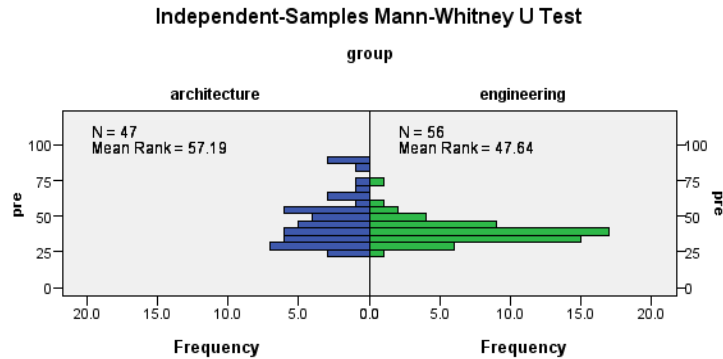


Figure 4.45 Mann-Whitney U test of pre-test scores between the two majors

However, with unequal variances and a non-normal distribution of scores, the Mann-Whitney U test, as shown in Figure 4.45, indicated no significant difference in the pre-test scores between engineering ($Mdn = 38$) and architecture ($Mdn = 42$) students and were similar, $U = 1072$, $p = .106$, $r = -0.16$. Hence, it was likely to indicate that engineering and architecture students had a similar level of vocabulary knowledge at the beginning of the course.

Post-test scores

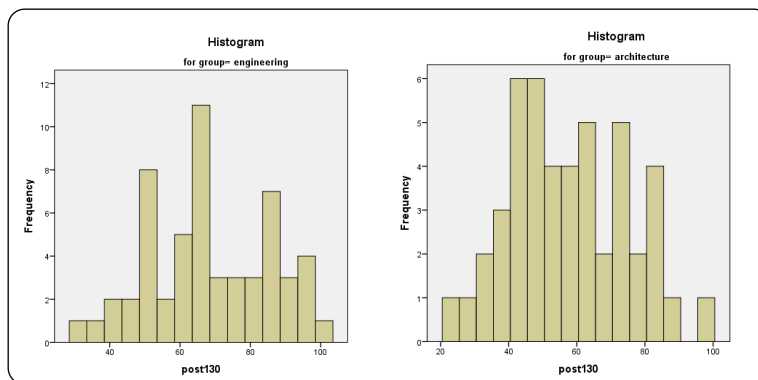


Figure 4.46 Post-test scores of engineering and architecture students

According to Figure 4.46, from experimental group, there were 56 engineering major students ($M = 68.95$, $SD = 17.53$), and 47 architecture major students ($M = 57.91$, $SD = 17.14$). Then, a normality check was conducted to explore the score distribution of both majors.

Figure 4.47 shows the output after analyses by the test of normality which illustrates an approximately normal distribution. Additionally, the Shapiro-Wilk test revealed that the participants' post-test scores were normally distributed, $D(103) = .981, p = .158$.

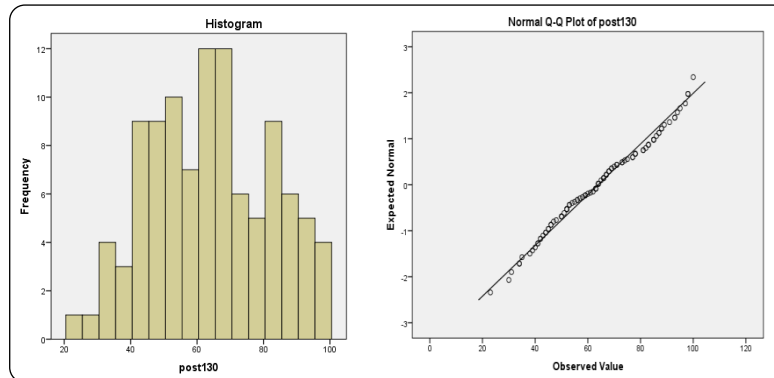


Figure 4.47 Output of a post-test score distribution of the two majors

Analysed by an independent-samples t -test, equal variances were found, $F = .006, p = .937$. Therefore, with equality of variances and a normal distribution of the scores, the independent-samples t -test indicated a significant difference of the post-test scores between the two majors, $t(101) = 3.214, p = .002, d = 0.64$. This indicated that engineering students outperformed the architecture students in improved vocabulary knowledge. The effect size ($d = 0.64$) indicates a moderate impact of the learning environment with greater impact on the engineering students.

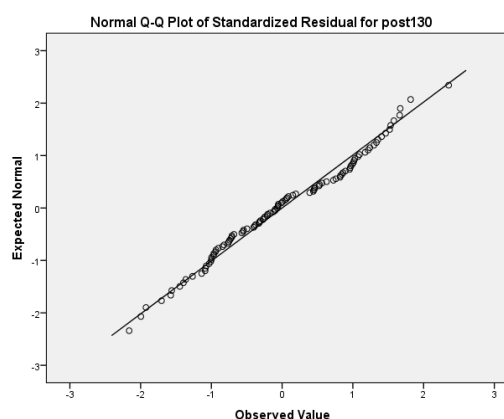


Figure 4.48 Standardised residual for post-test scores of the two majors

Levene's test from ANCOVA revealed equal variances, $F(1,101) = .053, p = .819$. As shown in Figure 4.48, the Shapiro-Wilk test revealed that the standardised residuals were normally distributed, $D(103) = .982, p = .174$.

Hence the results of a score distribution and residual check showed that the assumptions were met. The ANCOVA results revealed that, as a covariate, the pre-test had no main effects on the dependent variable, $F(1,100) = .706$, $p = .403$, $\eta_p^2 = .007$. Moreover, similarly to the independent-samples t -test, there was a significant difference in mean post-test scores, $F(1,100) = 11.004$, $p = .001$, $\eta_p^2 = .099$. That is, engineering students outperformed architecture students in post-test or increasing vocabulary knowledge. Additionally, comparing the estimated marginal means, it showed that engineering students' post-test scores ($M = 69.30$) were likely to be greater than architecture students' ($M = 57.49$). The estimated effect size (partial eta squared: $\eta_p^2 = .099$) also indicated a small impact, around 9.9%, of the teaching methods on the two majors within the experimental group.

Gain scores: Pre-test - Post-test

To find if the treatment main effect is significant, an analysis of gain scores was conducted to look at the change from pre-test to post-test. The participants' gain scores from pre-test to post-test (pre-post) used data from 56 engineering major students ($M = 29.57$, $SD = 16.27$) and 47 architecture major students ($M = 11.45$, $SD = 25.48$). Furthermore, an independent-samples t -test indicated a significant difference on the gain scores, between the two majors, $t(101) = 4.369$, $p < .001$, $d = 0.86$. Engineering students' gain scores were greater than the other major, and they were likely to see more change in vocabulary knowledge from pre-test to post-test than the architecture students. The learning environment seemed to have a larger effect towards the change on engineering students, based on the calculated effect size ($d = 0.86$).

To sum up, engineering and architecture students did not have a significant difference in English language proficiency and pre-existing vocabulary knowledge, but their increasing vocabulary knowledge tended to be significantly different. The engineering students were likely to perform better and gain more change than the other major. In addition, there was a small effect of the experiment more on the engineering major than the architecture students. Appendix 19 shows the summary of findings related to RQ4.

Research question 5

RQ5: To what extent do students' test scores differ between the classes?

At the fieldwork site, in this course, there were four registered classes which consisted of different types of students: class 1 [industrial electrical engineering (IE)], class 2 [logistics engineering (LE)], class 3 [logistics engineering (LE)] and class 5 [architecture and design (AD)]. To examine if differences existed between these particular classes, statistical analyses and comparisons were conducted to analyse the participants' scores in PET scores (language proficiency), pre-test, post-test, delayed test, and gain scores of 'pre-test - post-test', 'pre-test-delayed test', and 'post-test-delayed test', which are presented into the following parts.

PET Scores

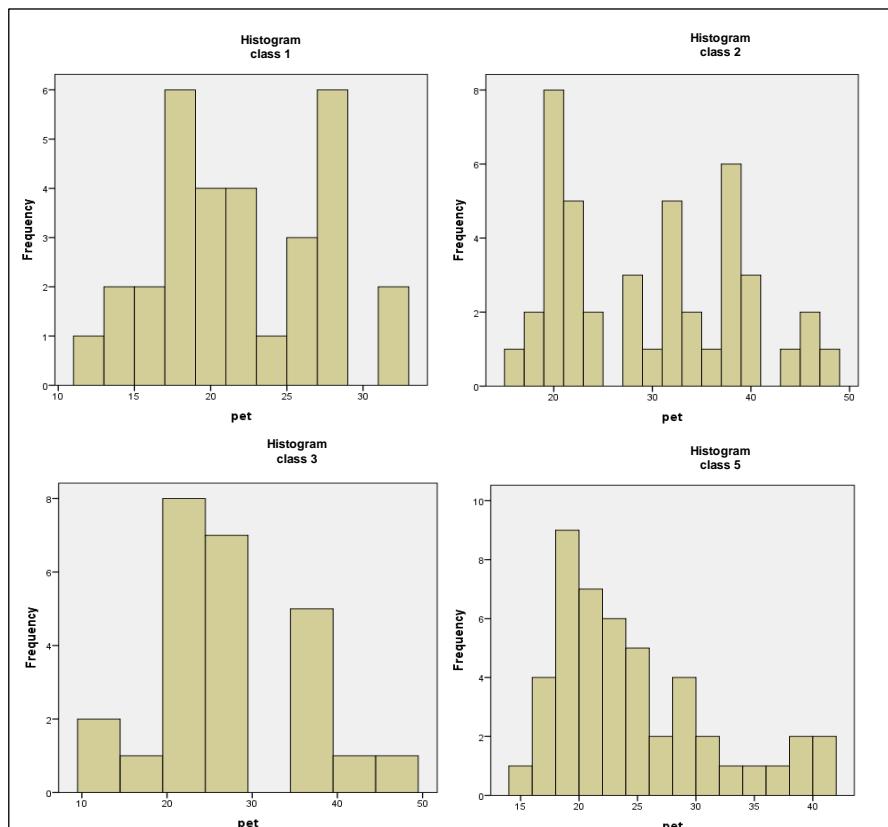


Figure 4.49 PET scores of the different classes

Figure 4.49 shows PET scores of the four classes, from different majors. The experimental group contained three classes: class 1 (IE) ($N = 31$, $M = 21.55$, $SD = 5.29$), class 3 (LE) ($N = 25$, $M = 26.96$, $SD = 8.55$), and class 5 (AD) ($N = 47$, $M = 24.30$, $SD = 6.85$), while the control group was randomly

assigned to class 2 (LE) ($N = 43$, $M = 29.40$, $SD = 9.06$). The test of normality was then analysed to explore the score distribution.

Figure 4.50 shows an approximate PET score distribution of all classes. The Shapiro-Wilk test indicated a non-normal distribution, $D(146) = .937$, $p < .001$. Moreover, Levene's test in a one-way ANOVA revealed a significant difference in equality of variances ($F = 4.64$, $p = .004$). The ANOVA also indicated the significant difference in their PET scores, $F(3,142) = 7.23$, $p < .001$, that is, their English language proficiency was different.

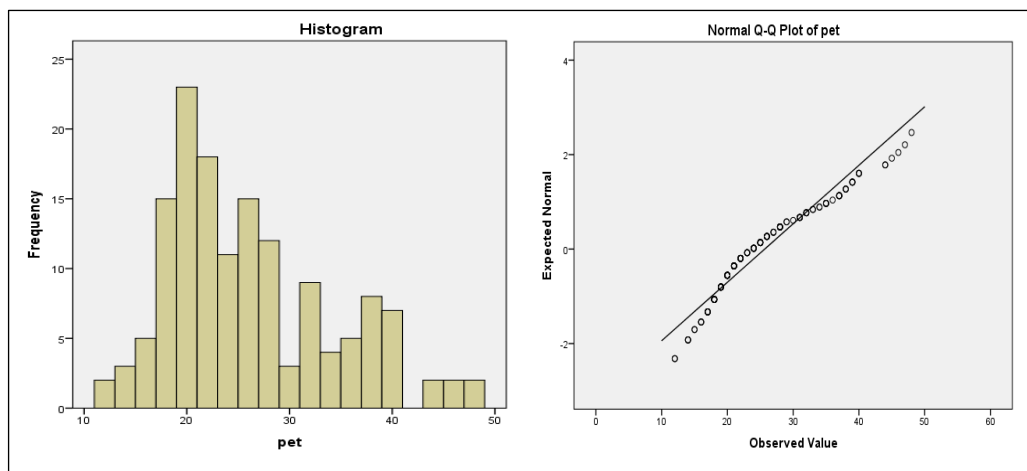


Figure 4.50 Distribution of PET scores (all classes)

A non-parametric test, the Kruskal-Wallis H test showed that there was a statistically significant difference in their language proficiency scores between the classes, $\chi^2(3) = 16.31$, $p = .001$. To identify where the statistically significant difference occurred, a post hoc test in ANOVA revealed similar language proficiency between classes 2 and 3. However, a significant difference was found between classes 1 and 2 ($p < .001$, $d = -1.02$), and between classes 5 and 2 ($p = .011$, $d = -0.64$). The findings indicated that class 2 outperformed classes 1 and 5 in language proficiency (the mean differences were 7.84 and 5.09, respectively). Figure 4.51 presents the mean plot between the different classes.

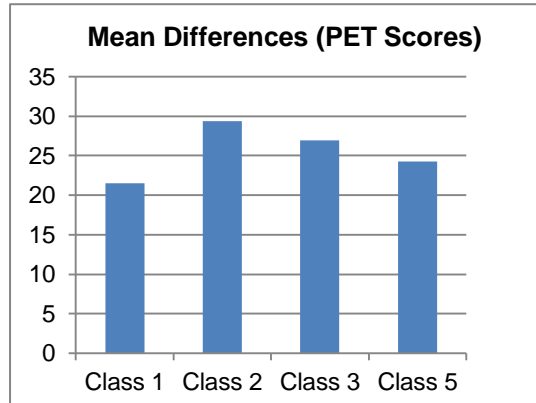


Figure 4.51 Mean differences (PET scores) between the classes

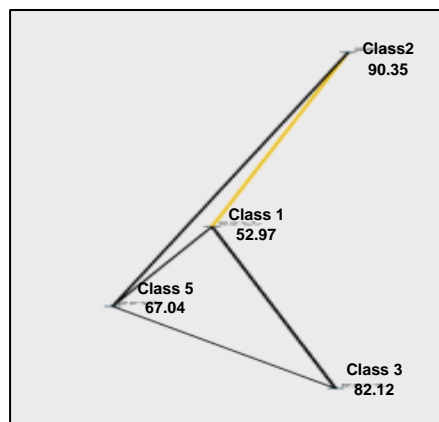


Figure 4.52 Pairwise comparison plot of PET Scores (Kruskal-Wallis H test)

Similarly, according to Figure 4.52, a pairwise comparison from the Kruskal-Wallis H test indicated a statistically significant difference between the classes 1 and 2 ($p < .001$), and classes 5 and 2 ($p = .009$). However, it indicated an additional pair with significant difference which occurred between classes 1 and 3 ($p = .010$). Regarding the results, classes 2 and 3 had an approximate English language proficiency level, which was higher than classes 1 and 5. Furthermore, class 1 tended to have the lowest level of language proficiency.

Pre-test scores

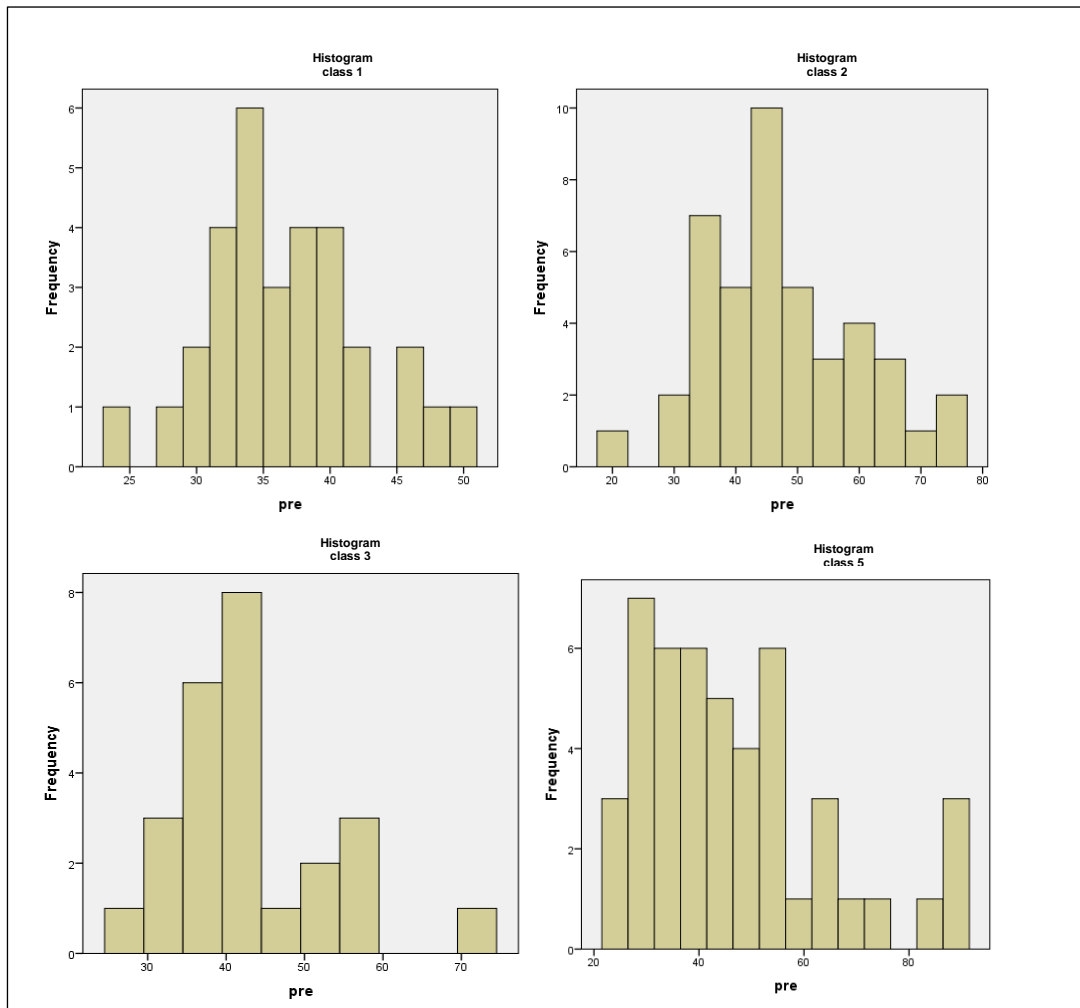


Figure 4.53 Pre-test scores of the different classes

Figure 4.53 shows pre-test scores of the four classes, from different majors. The experimental group contained three classes: class 1 ($M = 36.23$, $SD = 5.69$), class 3 ($N = 25$, $M = 43.28$, $SD = 9.85$), and class 5 ($M = 46.47$, $SD = 17.39$), while the control group was randomly assigned to class 2 ($M = 47.42$, $SD = 12.48$). The test of normality was then used to explore the score distribution, and the results are shown in Figure 4.54.

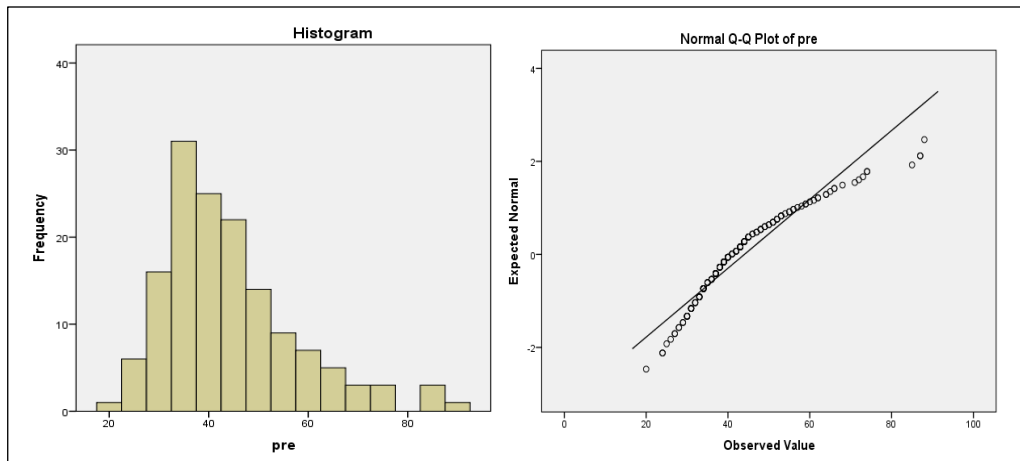


Figure 4.54 A pre-test score distribution of all classes

Figure 4.54 shows an approximate pre-test score distribution of all classes. The Shapiro-Wilk test indicated a non-normal distribution, $D(146) = .914$, $p < .001$. Moreover, Levene's test in a one-way ANOVA revealed a significant difference in equality of variances ($F = 10.27$, $p < .001$). The ANOVA also indicated a significant difference in their pre-test, $F(3,142) = 5.33$, $p = .002$, that is, their pre-existing vocabulary knowledge was different at the beginning.

The Kruskal-Wallis H test showed that there was a statistically significant difference in the pre-test scores between the classes, $\chi^2(3) = 17.74$, $p < .001$. To identify where the statistically significant difference occurred, a post hoc test in ANOVA revealed a significant difference between classes 1 and 2 ($p = .002$, $d = -1.09$), and between classes 1 and 5 ($p = .005$, $d = -0.73$).



Figure 4.55 Mean differences (Pre-test) between the classes

Figure 4.55 presents the mean plot between the classes. The findings indicated that classes 2 and 5 outperformed class 1 in the pre-test (the mean differences were 11.19 and 10.24, respectively). Likewise, according to Figure 4.56, a pairwise comparison from the Kruskal-Wallis H test indicated a statistically significant difference between classes 1 and 2 ($p < .001$), and classes 1 and 5 ($p = .017$). Regarding the results, class 1 tended to have the lowest level of vocabulary knowledge at the beginning of the course, while classes 2, 3 and 5 were likely to have an approximate level of pre-existing vocabulary knowledge at the beginning of the course.

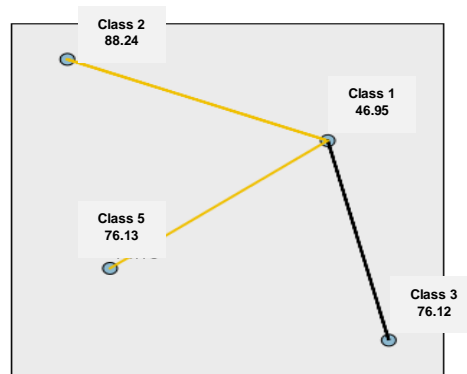


Figure 4.56 Pairwise comparison plot (Kruskal-Wallis H test)

Post-test scores

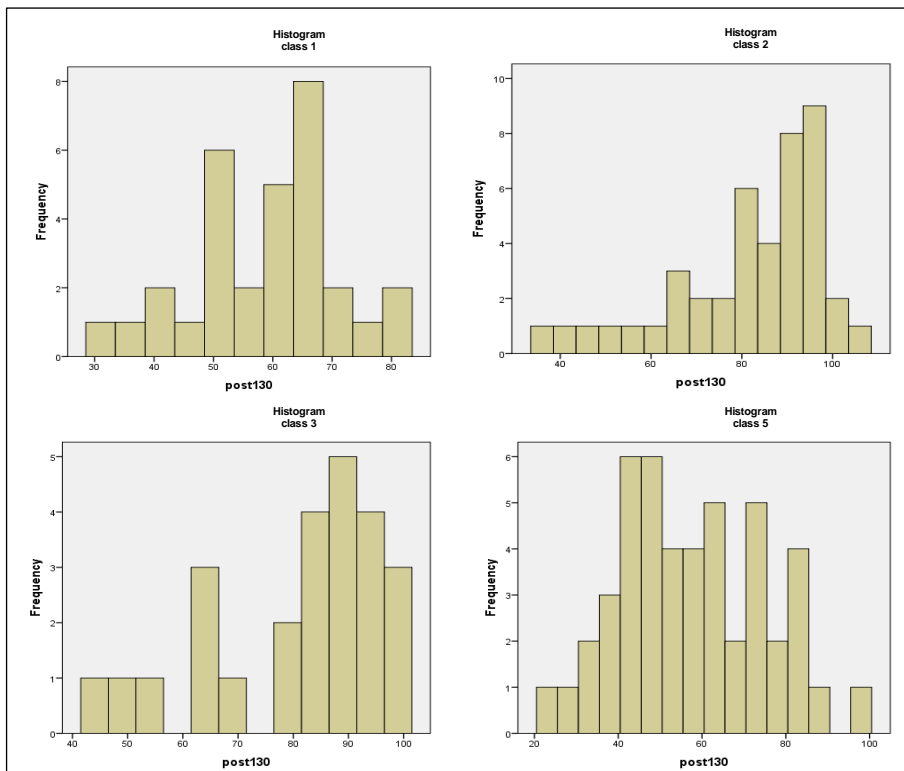


Figure 4.57 Post-test scores between the classes

Figure 4.57 presents the post-test scores of class 1 ($N = 31$, $M = 59.55$, $SD = 12.61$), class 2 ($N = 43$, $M = 81.95$, $SD = 16.74$), class 3 ($N = 25$, $M = 80.60$, $SD = 15.81$), and class 5 ($N = 47$, $M = 57.91$, $SD = 17.14$). The test of normality was also conducted to explore a score distribution for all participants. As shown in Figure 4.58, the output illustrates an approximate score distribution of all subjects. The Shapiro-Wilk test indicated a non-normal distribution, $D(146) = .975$, $p = .010$.

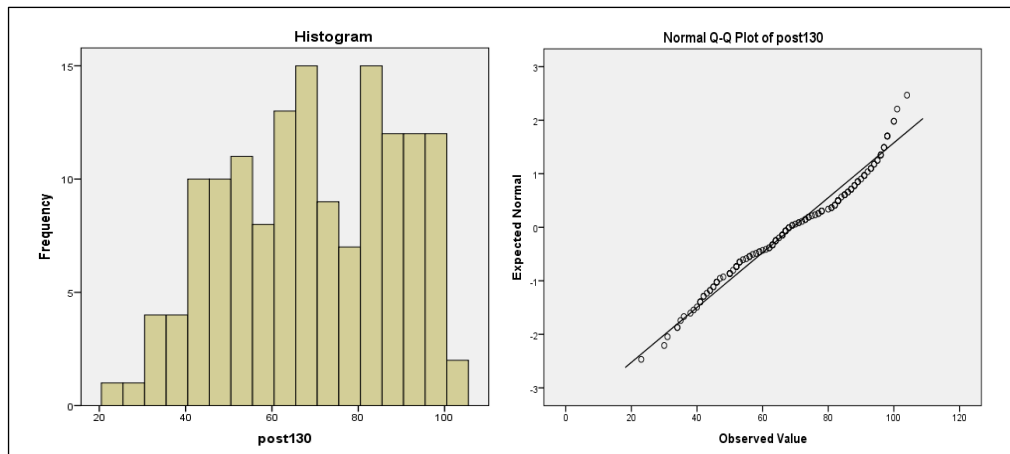


Figure 4.58 Output of a post-test score distribution (all classes)

Analysed by a one-way ANOVA, Levene's test revealed no significant difference in equality of variances ($F = 1.28$, $p = .283$). The analysis also revealed a significant difference in post-test scores, $F(3,142) = 25.10$, $p < .001$. A post hoc test revealed a significant difference between classes 1 and 2 ($p < .001$, $d = -1.48$), classes 1 and 3 ($p < .001$, $d = -1.49$), classes 5 and 2 ($p < .001$, $d = -1.36$), and classes 5 and 3 ($p < .001$, $d = -1.42$). Figure 4.59 presents the mean plot between the classes for the post-test scores.

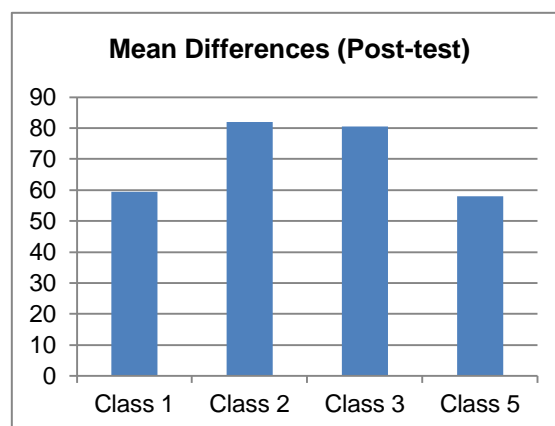


Figure 4.59 Mean differences between the classes

The findings indicated that classes 2 and 3 outperformed class 1 on the post-test. The mean differences were 22.41 and 21.05, respectively. Moreover, classes 2 and 3 also outperformed class 5 on the post-test, with the mean differences of 24.04 and 22.69, respectively. The calculated values of effect size from the comparisons (Sec.1-2: $d = -1.48$; Sec.1-3: $d = -1.49$; Sec.5-2: $d = -1.36$; Sec.5-3: $d = -1.42$) revealed that there was a large impact on classes 2 and 3, and related the learning environment to their increasing vocabulary knowledge.

With significantly different pre-test scores and to look into the results of a significant difference in post-test scores, the ANCOVA output revealed that, as a covariate, the pre-test had no main effects on the dependent variable, $F(1,141) = 2.26$, $p = .135$, $\eta^2 = .016$. Moreover, between the classes, there was a significant difference in mean post-test scores, $F(3,141) = 24.05$, $p < .001$, $\eta^2 = .338$. Regarding the impact of the instruction, the estimated effect size (partial eta squared: $\eta^2 = .338$) indicated a small effect, around 33.8%, on the students. Comparing the estimated marginal means showed that, being engaged in the blended learning environment, class 3's post-test scores were likely to be greater than classes 1 and 5, $M = 80.72$ (class 3), $M = 60.76$ (class 1), $M = 57.54$ (class 5). A pairwise comparison test indicated a statistically significant difference between classes 1 and 2 ($p < .001$), classes 1 and 3 ($p < .001$), classes 5 and 2 ($p < .001$), and classes 5 and 3 ($p < .001$). The mean differences were 20.67 and 19.96, 23.89, and 23.18, respectively.

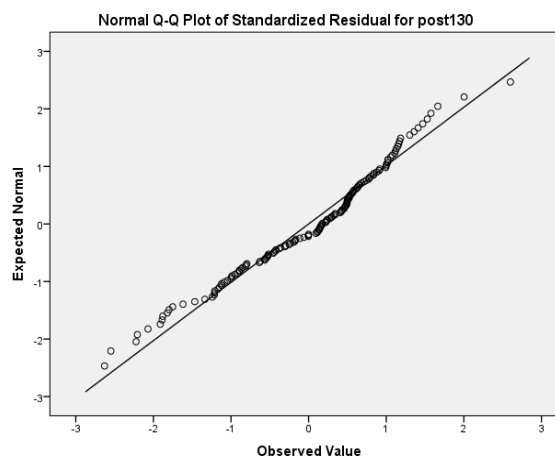


Figure 4.60 Standardised residual for post-test scores

However, although, from ANCOVA, Levene's test ($F(3,142) = 1.79, p = .151$) indicated equality of variances, when a normality check was carried out, the Shapiro-Wilk test revealed that the standardised residuals were not normally distributed, $D(146) = .975, p = .010$), as shown in Figure 4.60. Therefore, as the non-normal score distribution and the assumption were not met, the Kruskal-Wallis H test then showed that there was a statistically significant difference in post-test scores between the classes, $\chi^2(3) = 51.47, p < .001$.

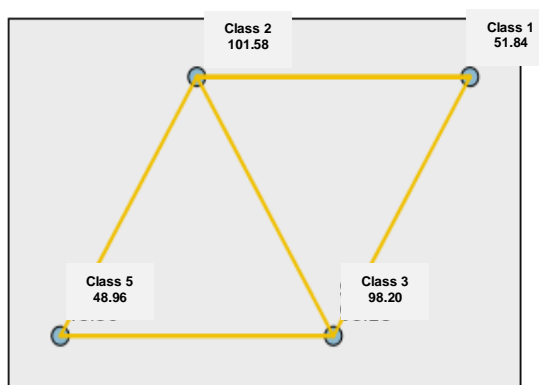


Figure 4.61 Pairwise comparison plot of post-test scores between the classes

Additionally, a pairwise comparison from the Kruskal-Wallis H test was analysed to explore a matched class with a significant difference, as shown in Figure 4.61. It indicated a statistically significant difference between classes 1 and 2 ($p < .001$), classes 1 and 3 ($p < .001$), classes 5 and 2 ($p < .001$), and classes 5 and 3 ($p < .001$). Based on the mean scores, it can be seen that classes 2 and 3 outperformed classes 1 and 5 in increasing vocabulary knowledge. Furthermore, comparing within the experimental group, class 3 was likely to perform better than classes 1 and 5.

Delayed test scores

As mentioned earlier in RQ2, part of students voluntarily participated to take the delayed test. Students in class 5 did not take part in the test; therefore, there were students from three classes who took the delayed test one month after the course ended.

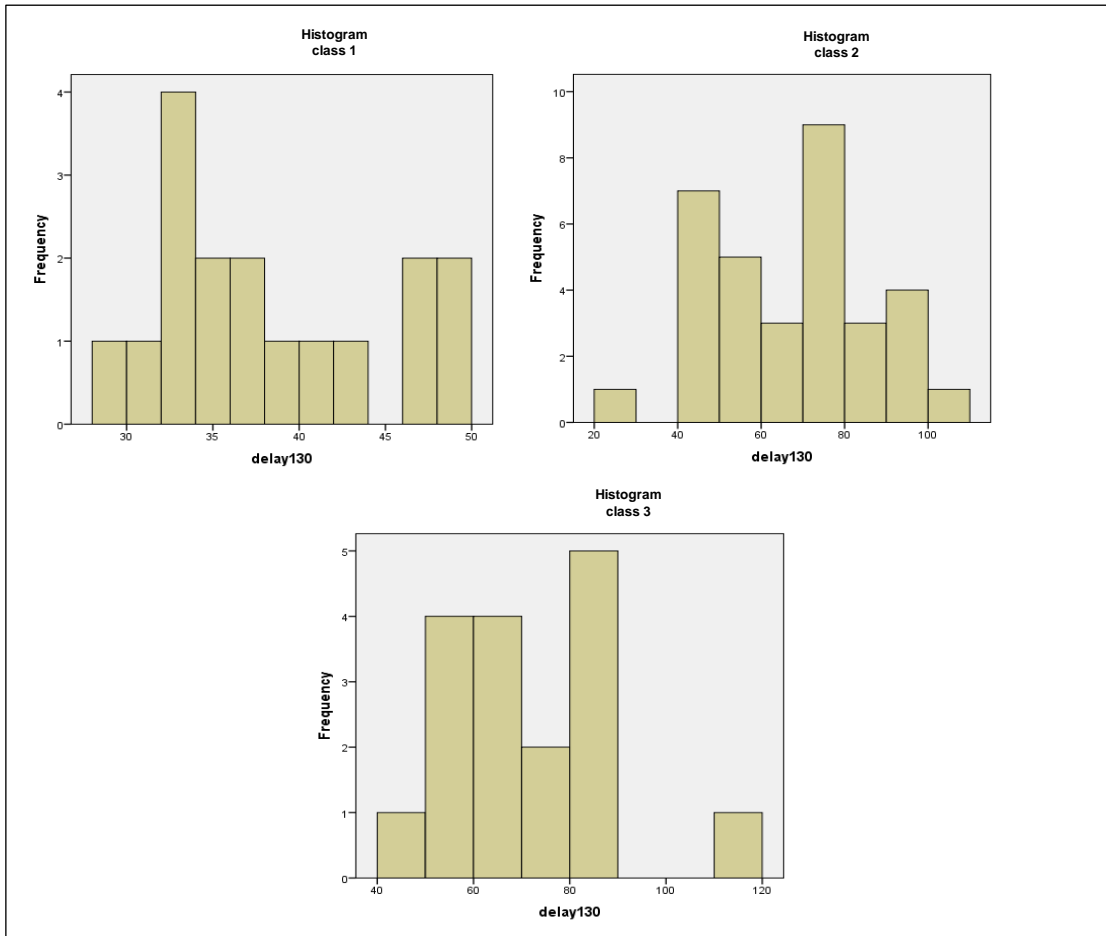


Figure 4.62 Delayed test scores of the different classes

Figure 4.62 shows their delayed test scores of class 1 ($N = 17$, $M = 38$, $SD = 6.56$), class 2 ($N = 33$, $M = 67.42$, $SD = 19.01$), and class 3 ($N = 17$, $M = 70.59$, $SD = 16.61$). The test of normality was then conducted to explore a score distribution of all classes. The output of the score distribution is presented in Figure 4.63.

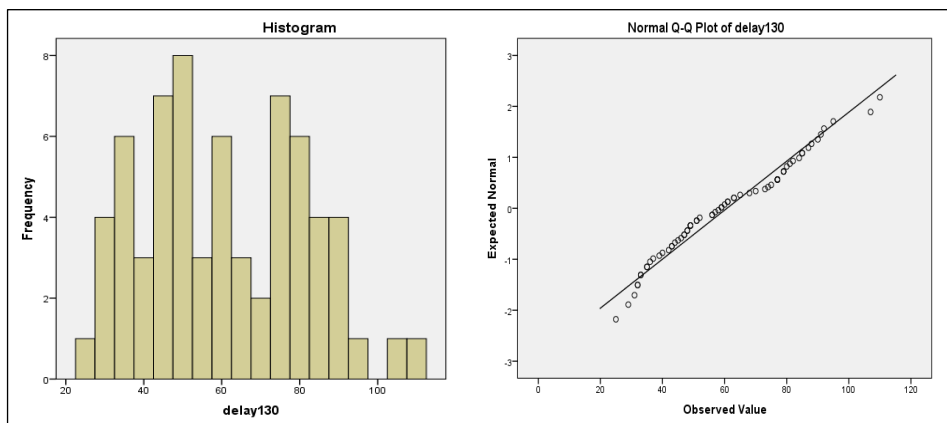


Figure 4.63 A delayed test score distribution (all students)

Figure 4.63 presents an approximate distribution of the participants' delayed test scores. The Shapiro-Wilk test revealed a normal score distribution, $D(67) = .964$, $p = .052$. Moreover, analysed by a one-way ANOVA, Levene's test revealed a significant difference in equality of variances (unequal variances assumed), $F = 9.51$, $p < .001$. The ANOVA also revealed a significant difference in the delayed test scores, $F(2,64) = 22.89$, $p < .001$, that is, the scores were significantly different between these classes.

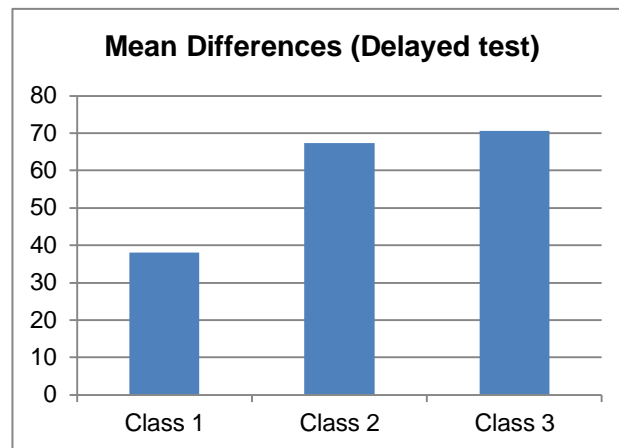


Figure 4.64 Mean differences in delayed test scores between the classes

As the mean plot shown in Figure 4.64, a post hoc test revealed a significant difference between classes 1 and 2 ($p < .001$, $d = -1.84$), and classes 1 and 3 ($p < .001$, $d = -2.58$). The findings indicated that classes 2 and 3 outperformed class 1 in the delayed test. The mean differences were 29.42 and 32.59, respectively. The calculated values of effect size (Sec.1-2: $d = -1.84$; Sec.1-3: $d = -2.58$) indicated a larger impact of the learning environment on classes 2 and 3, than class 1 on the rate of vocabulary knowledge retention.

With significantly different pre-test scores and to re-examine the results of a significant difference in delayed test scores, the ANCOVA results revealed that, as a covariate, the pre-test had main effects on the dependent variable, $F(1,63) = 26.42$, $p < .001$, $\eta_p^2 = .295$. Moreover, between the classes, there was a significant difference in mean delayed test scores, $F(2,63) = 15.61$, $p < .001$, $\eta_p^2 = .331$. Regarding the impact of the learning environment, the estimated effect size (partial eta squared: $\eta_p^2 = .331$) indicated there was 33.1% of a small effect on the subjects. Comparing the

estimated marginal means showed that class 3's delayed test scores were likely to be greater than classes 1 and 2 (class 3: $M = 70.69$; class 1: $M = 44.43$; class 2: $M = 64.06$). A pairwise comparison test from ANCOVA indicated a statistically significant difference between classes 1 and 2 ($p < .001$), and classes 1 and 3 ($p < .001$), with the mean differences of 19.63 and 26.27, respectively. To check if the assumption was met for ANCOVA, the Shapiro-Wilk test revealed a normal distribution, $D(67) = .982$, $p = .420$, as shown in Figure 4.65.

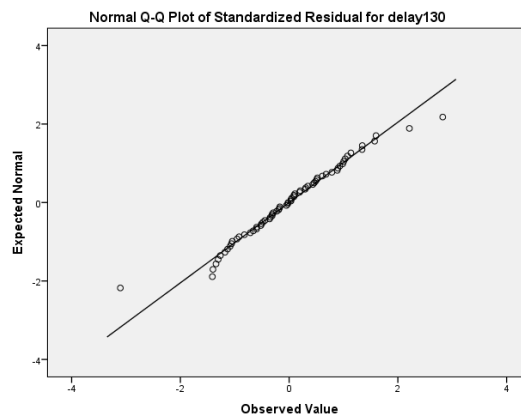


Figure 4.65 Normal Q-Q plot for standardised residual for delayed test scores

However, from ANCOVA, Levene's test indicated unequal variances, $F(2,64) = 7.33$, $p = .001$. To re-examine the difference of the delayed test scores between the classes, the Kruskal-Wallis H test showed that there was a statistically significant difference in the delayed test scores, $\chi^2(2) = 30.98$, $p < .001$.

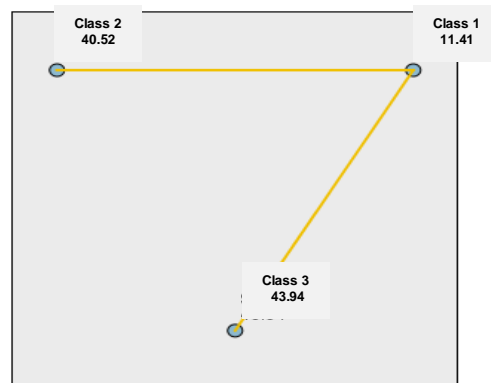


Figure 4.66 Pairwise comparison plot of delayed test scores between the classes

Likewise, as shown in Figure 4.66, a pairwise comparison from the Kruskal-Wallis H test indicated a statistically significant difference between classes 1

and 2 ($p < .001$), as well as classes 1 and 3 ($p < .001$). It can be seen that classes 2 and 3 outperformed class 1 in vocabulary knowledge retention. Based on the mean delayed test scores, class 3 was likely to retain greater vocabulary knowledge than the others.

Gain scores: pre-test - post-test, pre-test - delayed test, post-test - delayed test

To find out whether the change in students' vocabulary knowledge retention was affected by the treatment, gain scores derived from the change in scores between the pre-test to post-test, pre-test to delayed test, and post-test to delayed test were analysed using descriptive statistics and one-way ANOVA. The results are shown in the following parts.

Pre-test - Post-test

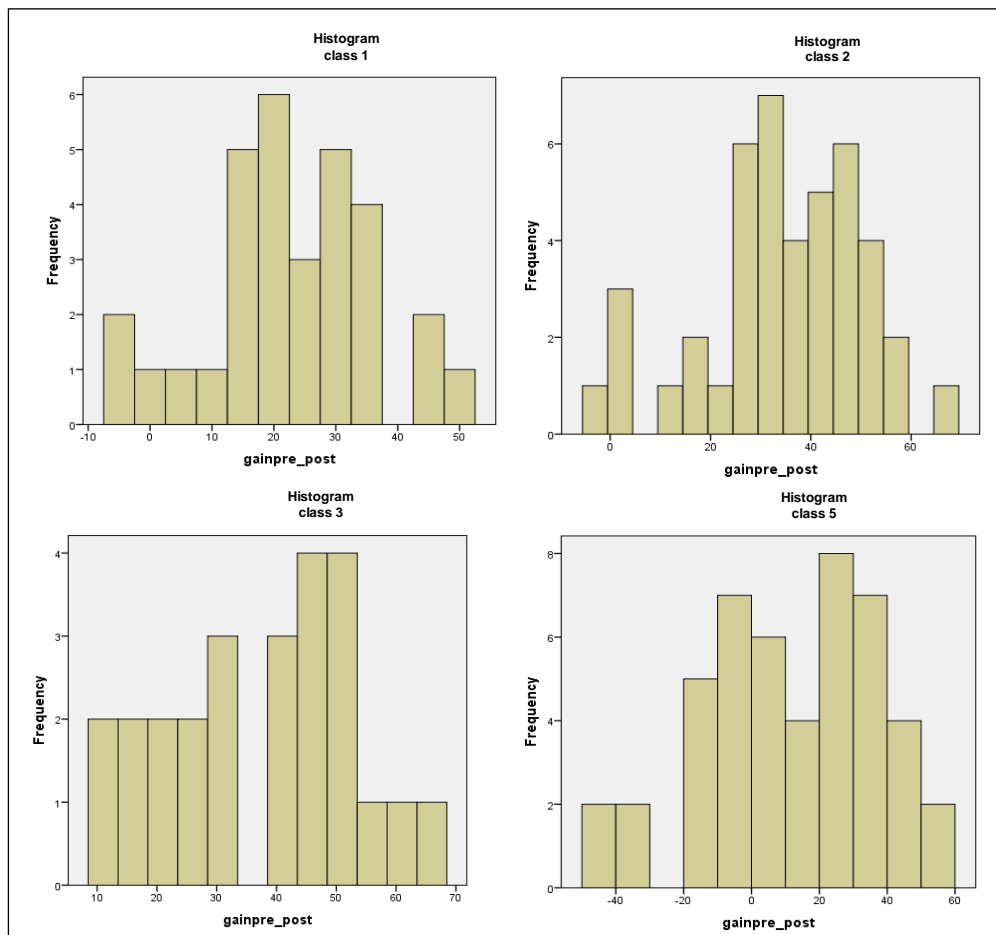


Figure 4.67 Gain scores (pre-test - post-test) between the classes

Figure 4.67 shows the comparisons of gain scores of pre-test to post-test (pre-post) from class 1 ($N = 31$, $M = 23.32$, $SD = 13.58$), class 2 ($N = 43$, $M = 34.53$, $SD = 16.01$), class 3 ($N = 25$, $M = 37.32$, $SD = 16.22$), and class 5

($N = 47$, $M = 11.45$, $SD = 25.48$). Analysed by one-way ANOVA, Levene's test revealed a significant difference in equality of variances ($F = 7.52$, $p < .001$). Moreover, the ANOVA output revealed a significant difference, $F(3,142) = 14.81$, $p < .001$. To identify where a statistically significant difference occurred, a post hoc test revealed a significant difference between classes 1 and 3 ($p = .045$, $d = -0.95$), classes 5 and 2 ($p < .001$, $d = -1.07$), and classes 5 and 3 ($p < .001$, $d = -1.14$). The findings indicated that class 3 outperformed class 1 in the gain scores between pre-test to post-test (mean differences = 13.99). Furthermore, classes 2 and 3 outperformed class 5 in retaining greater vocabulary knowledge, with the mean differences of 23.09 and 25.87, respectively. Regarding the impact from the instruction, the calculated values of effect size (classes 1-3: $d = -0.95$; classes 5-2: $d = -1.07$; classes 5-3: $d = -1.14$) indicated a larger effect on classes 2 and 3, related to the change in their vocabulary knowledge. As can be seen, based on the mean gain scores, class 3 was likely to gain the greatest change in vocabulary knowledge.

Pre-test - Delayed test

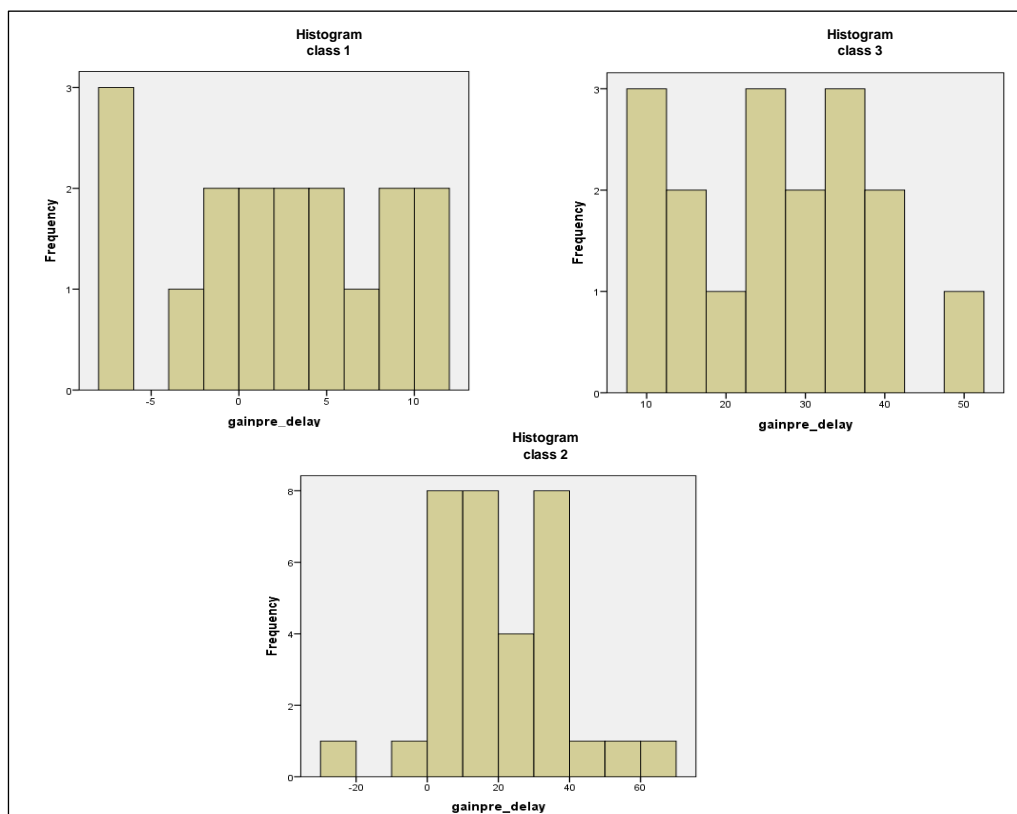


Figure 4.68 Gain scores (pre-test - delayed test) between the classes

Figure 4.68 shows the comparisons of gain scores derived from the change in scores between the pre-test to delayed test (pre-delayed) in class 1 ($N = 17$, $M = 1.88$, $SD = 5.99$), class 2 ($N = 33$, $M = 19.36$, $SD = 16.98$), and class 3 ($N = 17$, $M = 26.76$, $SD = 11.66$). Levene's test from one-way ANOVA revealed a significant difference in equality of variances ($F = 6.42$, $p = .003$). Moreover, the ANOVA output revealed a significant difference between the classes, $F(2,64) = 15.20$, $p < .001$. To compare matched classes with a significant difference, a post hoc test revealed a significant difference between classes 1 and 2 ($p < .001$, $d = -1.22$), and classes 1 and 3 ($p < .001$, $d = -2.68$). The findings indicated classes 2 and 3 outperformed class 1 with the mean differences of 17.48 and 24.88, respectively. Classes 2 and 3 were likely to have more change in vocabulary knowledge retention from the beginning of the course until one month after the course ended. Regarding the impact from the teaching methods, the effect size (classes 1-2: $d = -1.22$; classes 1-3: $d = -2.68$) indicated a larger effect on classes 2 and 3 in terms of the change in their vocabulary knowledge retention from the beginning of the course. Moreover, based on the mean gain scores, class 3 seemed to have the highest change comparing to the two other classes.

Post-test - Delayed test

Figure 4.69 shows the comparisons of gain scores derived from the change in scores between the pre-test to delayed test (post-delayed) in class 1 ($N = 17$, $M = -24.53$, $SD = 12.46$), class 2 ($N = 33$, $M = -14.97$, $SD = 14.29$), and class 3 ($N = 17$, $M = -17.06$, $SD = 13.11$). Furthermore, analysed by one-way ANOVA, Levene's test revealed equal variances ($F = .304$, $p = .739$). Moreover, the analysis revealed no significant difference in the gain scores (post-delayed), $F(2,64) = 2.84$, $p = .066$.

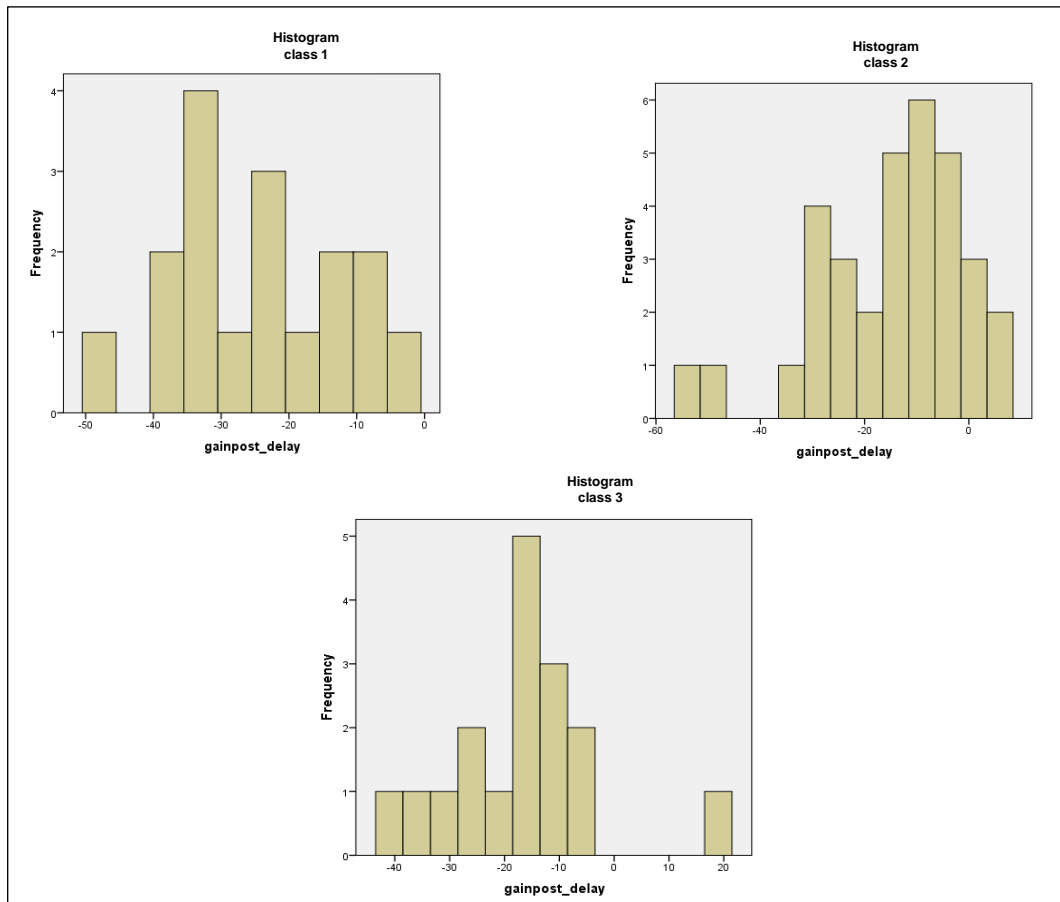


Figure 4.69 Gain scores (post-test - delayed test) between the classes

To identify if any differences occurred, a post hoc test indicated no significant difference between the classes [classes 1 and 2 ($p = .064$, $d = -0.69$); classes 1 and 3 ($p = .339$, $d = -0.58$)]. It was likely that all classes retained their vocabulary knowledge retention at a similar rate. Classes 1 and 3, from the experimental group, probably gained similar change through the learning environment. With regard to the effect of the instruction, the effect size (classes 1-2: $d = -0.69$; classes 1-3: $d = -0.58$) showed a moderate impact on the change of their vocabulary knowledge retention after the course ended. Moreover, based on the mean gain scores (post-delayed), class 2, from the control group, was likely to retain their vocabulary knowledge better than the others. The table of summary of findings related to RQ5 is presented in Appendix 20.

Research question 6

RQ6: To what extent are there correlations between students' English language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge and vocabulary knowledge retention?

A Pearson product-moment correlation coefficient was computed to assess the relationships between 1) PET (language proficiency) and pre-test (pre-existing vocabulary knowledge); 2) PET and post-test (increasing vocabulary knowledge); 3) PET and delayed test (vocabulary knowledge retention); 4) pre-test and post-test; 5) pre-test and delay-test; and 6) post-test and delayed test. Scatter plots in Figure 4.70 summarise the results as follows.

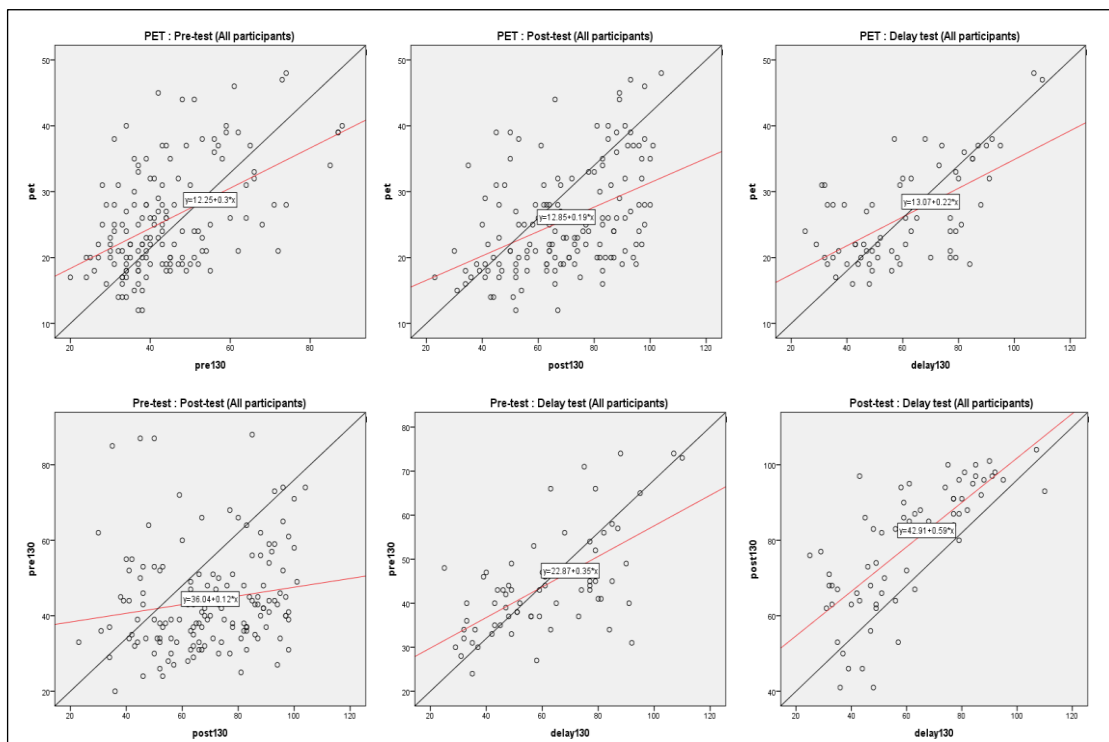


Figure 4.70 Correlation coefficients of all test scores (All participants)

1) PET and pre-test scores were positively correlated, Pearson's $r(146) = .51$, $p < .001$. Overall, there was a strong, positive correlation between English language proficiency and pre-existing vocabulary knowledge. When language proficiency increases, one's pre-existing vocabulary knowledge is likely to increase as well.

2) PET and post-test scores were positively correlated, Pearson's $r(146) = .45$, $p < .001$. Overall, there was a moderate, positive correlation between English language proficiency and increasing vocabulary knowledge.

Therefore, with higher language proficiency, vocabulary knowledge is possibly increasing.

3) PET and delayed test scores were positively correlated, Pearson's $r(67) = .61, p < .001$. In general, there was a strong, positive correlation between English language proficiency and vocabulary knowledge retention. Higher language proficiency may serve an increasing rate of vocabulary knowledge retention.

4) Pre-test and post-test scores were positively correlated, Pearson's $r(146) = .17, p = .045$. Overall, there was a moderate, positive correlation between pre-existing vocabulary knowledge and increasing vocabulary knowledge. That is, with higher pre-existing vocabulary knowledge, a level of new vocabulary knowledge could increase.

5) Pre-test and delayed test scores were positively correlated, Pearson's $r(67) = .62, p < .001$. Overall, there was a strong, positive correlation between pre-existing vocabulary knowledge and vocabulary knowledge retention. In other words, the higher pre-existing knowledge is, the greater vocabulary knowledge could be retained.

6) Post-test and delayed test scores were positively correlated, Pearson's $r(67) = .74, p < .001$. As can be seen, there was a strong, positive correlation between increasing vocabulary knowledge and knowledge retention. The more vocabulary knowledge is increasing, higher the rate of vocabulary knowledge retention is.

From the results, it could be concluded that English language proficiency was correlated with pre-existing vocabulary knowledge, increasing vocabulary knowledge, and vocabulary knowledge retention. That is, a learner's higher language proficiency may indicate a higher level of pre-existing vocabulary knowledge and may serve as a basis to enhance further vocabulary knowledge and knowledge retention. Similarly, with higher pre-existing word knowledge, learners probably retained more vocabulary. However, although increasing pre-existing knowledge occurred, a level of new vocabulary knowledge might not be rising or probably increased at a small level. The table in Appendix 21 summarises the correlational results and statistical output.

Research question 7

RQ 7: To what extent is the use of a blended learning approach feasible?

To explore the feasibility of blended learning instruction, the quantitative data was collected through an online questionnaire to obtain students' attitudes and perceptions towards the blended learning environment. Furthermore, the qualitative data derived from class observations by two independent teachers and the researcher, and a semi-structured interview with some participants and the teachers to gain in-depth information regarding instruction. Therefore, the findings are reported and explained into the following categories based on the research tools: independent teacher observation and interviews, researcher observation, questionnaire, and student interviews.

1. Independent teacher observation and interviews

To perceive the feasibility of blended learning instruction from teacher perspectives, two English language university lecturers at the fieldwork site were kindly invited to conduct their observation during the course, with guided teacher observation rubrics provided (see Appendix 3). One lecturer observed a class before the midterm exam, while the other did another observation with the same class after the midterm exam. After the observations, the teachers were interviewed to give in-depth information regarding their ideas about blended learning instruction and feasibility of the blended learning approach. Based on the coding of the qualitative data from their observation and interviews, their perceptions, attitudes and suggestions regarding the blended learning approach were divided into five categories: lesson plan, before-class session, in-class session, wrap-up session, and feasibility.

1.1. Lesson plan

According to the independent teachers' interview, from their view, they agreed that it was appropriate for students to do a small presentation of what they learnt from the self-study content at the beginning of the lesson. At the observation, the teachers could indicate that the instructional model of the flipped classroom was used in this course. They also suggested going slightly into more detail regarding the structure of review and

implementation, as one observer commented “It might be necessary to identify what will be seen in the lesson plan, including what the organisation of review structure looks like.” Furthermore, she also suggested that the lesson plan should indicate who will implement the before-class content, e.g. group assignment or students’ presentation, in order to be clear that it is student-centred not teacher-centred.

1.2 Before-class session

The teachers viewed that the lesson stated clear objectives and an integrated appropriate use of technology. However, one of the teachers was concerned whether the lessons are suitable for learners’ level -- too easy or difficult for them. Hence, she suggested that students should be asked for feedback on the content organisation, whether it is well-organised or understandable enough to follow through for them. Regarding the self-study content, the observers, therefore, gave some recommendations of indicating clear directions, preparing for some technical limitations that might occur while completing a self-study exercise on the online platform (e.g. wrong answers probably caused by possible typos or spacing), and exploring students’ feedback of the content.

1.3 In-class session

In terms of the lesson introduction, from the observers’ views, the content was suitable to refresh students’ pre-existing knowledge. Around 80% of students tended to understand when the class was instructed in English language. Overall, activities were appropriate for most of the learners as they could follow through the lesson; however, levels of difficulties and providing English-English word definition might not be applicable to every learner. From the observation, most of the students were well-disciplined, while some others were restless during the lesson. Furthermore, they were likely to be able to create a piece of work during the activity, rather than sitting and listening. The lesson was likely to rush to wrap up due to time limits.

Regarding the instructor’s personality, the observers viewed that the instructor was an easy-going person, which brought about good rapport with the students that allowed them to perform. One of the observers viewed that

the teacher should have an affective filter which builds up good rapport with the students, as she commented "...we shouldn't focus on accuracy so excessively that students aren't able to perform and show their learning capabilities." From the teacher observation, the instructor attempted to focus on a Q&A teaching style to engage most learners, and used an effective question-asking method for class management. For example, while listening to the questions, all students were given a chance and attempts to figure out the answers together before being selected individually to answer them.

Several recommendations were proposed for this session. First, based on the engineering students' characteristics, more active tasks should be provided, and learners' characteristics should be taken into consideration when organising activities. Second, students should be monitored more thoroughly during activities. In terms of use of technology, although the instruction incorporated good use of audio-visual technology, it was recommended to be certain to carefully select interesting videos or media which allow students to learn from them effectively. Furthermore, other additional activities that led to mastery of vocabulary should be indicated in the lesson plan. To encourage learners to be self-disciplined, it was suggested to create activities which could be monitored while they are managing the assigned tasks. Despite class time limits, tasks and activities, which always consume more time, are still and rather recommended than lectures.

1.4 Wrap-up session

Based on the observation, the teachers viewed that the assessment was clearly related to the learning objectives, and summarising the lesson with a web-based game was very effective. One of the teachers viewed that, to wrap up the lesson, applying knowledge with an activity should emphasise an outcome-based performance, and should allow students to concentrate, be more active with the lesson, as she commented "The learning goal should represent an authentic task which leads students to produce something relevant to real contexts, and something that they can apply into the real contexts." Based on their views, the assessment, therefore, should

be focusing on authentic tasks to evaluate the learners' outcomes and to give them ideas of what they could use in the real-life contexts.

1.5 Feasibility

With respect to the feasibility of blended learning towards students' learning at the tertiary level, from the teachers' perspectives, a blended learning approach could be applied to university students, especially in language courses. The flipped classroom is one of the blended learning models where students need to study the content beforehand and practice in classroom with the teacher's facilitation or coaching. In English language courses, the flipped classroom is appropriate as it focuses on students' skill-learning subjects and encourages them to be autonomous learners. The teachers also recommended that, regarding before-class self-study content, students should be provided with extra marks, and the online system should be able to detect students' access history of online self-study effectively. Moreover, content for the in-class session should be authentic, accessible and challenging. That is, it should allow learners to be intrinsically-motivated and to realise the importance or the use of before-class content for classroom practice. Additionally, the in-class content should be adjusted to suit the learners' characteristics or their needs in a particular setting. In terms of students and teachers who are expected to be in the blended learning environment, training and preparation before the course starts are necessary for them to avoid misunderstandings. Learners' readiness is also important when they are engaged in before-class, in-class, wrap-up sessions in the blended learning course. They should have willingness and a determined character to learn the interactive content and manage their own learning. Regarding the teacher aspect, willingness for hard work in the preparation of lessons and creating materials is considered in priority need.

Summary of independent teacher observation

To sum up the observers' perspectives on the feasibility of blended learning in English language courses, firstly, it is useful for students to do a presentation regarding what was learnt from the self-study content in before-class sessions. The online content requires clear objectives, directions, and concerns with possible technical limitations on an online

platform. Regarding the in-class session, the proper level of difficulty of content and tasks for learners and their characteristics should be taken into consideration to enable all or most of them to engage in activities. The teacher's role is also important as a class facilitator to monitor them thoroughly while doing activities, and to develop good rapport with them in order to create an appropriate learning atmosphere and stimulate them to perform. Furthermore, careful selection and good use of technology are necessary to be integrated into the instruction which allows students to learn from the media effectively. In the wrap-up session, students should be encouraged to be active and evaluated with authentic tasks which could be applied into real contexts. Throughout the course, students' feedback on materials, such as online self-study content, in-class tasks and activities, and other suggestions, is important for course improvement. In terms of skill-learning subjects, the flipped classroom model probably suits English language courses as it encourages learners to undertake self-study outside the classroom and utilise it for in-class practice. To achieve satisfying results, it requires learners' readiness and willingness, that is, training and introduction to the course are necessary to prepare themselves before the course starts. Students need to be willing to devote their study time in before-class sessions, and it is important for them to realise the importance of self-study which is used for practice during the in-class session. Regarding the teacher's role, it requires hard work to provide meaningful and authentic lessons for learners to be motivated for the utmost participation in the course. Table 4.1 summarises the observation results as follows.

Table 4.1 Summary of independent teacher observation and interview

Lesson plan	Sessions			Feasibility
	Before-class	In-class	Wrap-up	
Appropriate to have students work in groups to do a small presentation of what they have learnt from before-class	Clear objectives and appropriate use of technology Need of students' feedback on the	Appropriate activities for most of the students Need to concern with the level of	Clear learning objectives and appropriate use of a game-based wrap-up activity Recommended	Suitable to use the flipped classroom with a skill subject as English which needs a lot of practice

Lesson plan	Sessions			Feasibility
	Before-class	In-class	Wrap-up	
<p>self-study, for the introduction part</p> <p>Recommended to identify the lesson plan structures more clearly</p>	<p>content and organisation of the online self-study</p> <p>Being aware of some technical limitations in using the online platforms</p>	<p>content difficulty and delivery of instruction in English language</p> <p>Importance of good rapport between teacher and students</p> <p>Need to concern about the appropriate selection of technology incorporated with tasks and activities</p>	<p>to rely on authentic assessment related to application in real-contexts</p>	<p>Need extra marks or incentives and detectable access history in before-class online self-study</p> <p>Concerns with authentic materials and assessment, and learners' characteristics and readiness</p> <p>Requiring teachers' willingness for hard work and efforts in preparing and managing the blended learning course</p>

2. Researcher observation

During the term of 15 weeks in total, as the role of the instructor to this course, all three-hour classes were observed by noting down students' learning, participation and behaviour every week. Based on the coding of the notes of my class observation in the blended learning and traditional classrooms, the key observation findings are summarised into the following categories: before-class session, in-class session, wrap-up session, and students' overall behaviour and learning outcomes.

2.1 Before-class session

Regarding before-class sessions where students were required to undertake online self-study outside the classroom, they usually received notifications of the self-study assignment which was put on an online social networking group as a link. Most students, around 90%, always checked the notifications and took responsibility for every online self-study assignment, while a few of them did not follow the announcement for the group.

Regarding the content from each before-class session, a group was assigned to review and do a presentation at the beginning of the in-class session. Almost every group were responsible for this group assignment, and many of them did the presentation with PowerPoint slides.

2.2 In-class session

During in-class sessions or when students' learning was taking place through tasks or activities inside the classroom, from the observations, the students were active and attentive in group work. For example, during a group activity, they were assigned to create their group company's profile, by using a word processor to write and decorate it, saving it in a jpeg format, and uploading it to a social networking group where the other groups or the whole class could view and make comments. Posting their group work on the social networking platform allowed the teacher to give immediate feedback or sticker comments which could interest and engage students with their peers' work. They were more enthusiastic and creative and gave interesting illustrations to their group work. In some weeks, students were assigned to complete their own CV and have a conversation with their partner regarding the CVs, and they were generally attentive to do the individual and pair work. However, teacher's facilitation and monitoring were needed during the whole activity to control them to finish within the time constraints. After the practice, some pairs were randomly selected to test or demonstrate what they practiced to the whole class. Occasionally polling and voting for the best group work were set up with incentives.

During instruction in the experimental group, the class could be accessible to monitor each student, unlike the traditional classroom which needed to set up desks, most seats were difficult to access for one-to-one monitoring. The large class size in some classes was a factor which probably limited the accessibility of monitoring for teacher. Occasionally, during a pair-work activity, it was difficult to monitor every single pair of students within the time limits, but it was more practical to have a random check instead. Furthermore, based on their language skills, many of them were able to use tenses at a good level and had existing word knowledge. In some classes, when students might not understand a how-to on doing a task, more

examples or guidance were, therefore, needed in the presentation slides before starting the activity.

Regarding to their familiarity with the use of technology, although students may need some technical advice to deal with the output of their group work, generally, they were not having difficulties in dealing with using computers or when searching for information. For example, an online survey was used for the lesson introduction and students could complete it on their computer or their smartphone without any technical problems. Moreover, using a social networking platform in doing a group activity was also convenient, for example, the teacher posted a document file for students to choose the most suitable hotel or accommodation for their group, and write a comparison between them. Then, they posted their work (in a jpeg format) on the platform. Sometimes in a group activity, using a sharing document file with the whole class worked well in terms of sharing comments and being able to view synchronous response or feedback from peers or teacher, and their behaviour also needed to be monitored to ensure proper manners and politeness during this activity.

Class time was fully spent almost every week. Some in-class reading or listening activities consumed time, especially when students were slow in reading or the listening task was probably too difficult for them. Students were usually assigned to read with their partner or with their group. During the reading activities, students were still monitored. The content seemed to suit most of the students' level, and they were looking up word meanings on their smartphone to assist them while reading. In some units, there were not follow-up questions provided in some reading activities, so I made up some of them to guide students while reading through the text. To wrap up the reading activity, calling an individual to summarise an activity was likely to be effective as it stimulated each student to be attentive or prepared to present what they had learnt.

2.3 Wrap-up session

Using game-based activities to wrap up the lesson or review vocabulary allowed students to be active and engaged effectively. However, in some weeks, some lessons, activities, or vocabulary wrap-up games were

occasionally skipped due to time constraints. Therefore, students were occasionally assigned to have an after-class vocabulary review instead. During end-of-unit quiz sessions, students were taking the quiz on an online platform, and it took them approximately 30 minutes to complete it. Some parts of the quiz might be complicated, so sometimes it needed to be clarified at the beginning. Their submitted responses were recorded online and checked manually by the teacher. This way of taking the quiz online could get rid of the concern with sufficient numbers of test papers, which happened in the control group class, and all responses could be checked conveniently on the online platform.

2.4 Students' overall behaviour and learning outcomes

It was likely that students' behaviour and outcomes differed between different majors and classes. For example, during the course, most of the time architecture major students were not as attentive and motivated, and not participating at a satisfactory level. Sometimes a few groups from this major did not take responsibility for the before-class content review assignment. Due to their personal or unknown reasons, their participation varied in some weeks -- they participated well or were not attentive to the class. They were sometimes absent when they had to deal with their work project regarding their major. Most engineering students were likely to be more responsible and paying better attention and participated well in every activity and practice.

Apart from the scores of PET, pre-test, post-test and delayed test, students from the different classes performed differently in other course evaluation criteria: end-of-unit quiz, midterm exam, final exam, before-class participation, class attendance, and in-class participation. Table 4.2 shows students' average score percentage, derived from end-of-unit quizzes (10%), midterm (35%) and final (30%) exams. As can be seen, classes 2 and 3 outperformed the two other classes. The scores between classes 2 and 3, and between 1 and 5 were at an approximate level. Seemingly, class 2 did slightly better in end-of-unit quizzes, while class 3 performed slightly better in the midterm and final exams which tested students the content

from the coursebook. Comparing all classes, class 5 appeared to gain the lowest percentage in all score criteria.

Table 4.2 Average score percentage between the different classes

Classes	End-of-unit quiz scores (10%)	*Midterm exam scores (35%)	*Final exam scores (30%)
1	6.63	20.31	15.43
2	8.44	27.62	22.54
3	8.10	28.23	22.71
5	5.56	18.35	14.31

Classes 1,3,5 = Experimental group

Class 2 = Control group

*Students were tested based on the coursebook content in the 9th and 17th week.

Table 4.3 Average percentage in before-class participation, class attendance and in-class participation between the different classes

Classes	Before-class participation (5%)	Class attendance (5%)	In-class participation (5%)
1	4.65	4.64	4.82
2	3.85	4.58	4.68
3	4.73	4.76	4.89
5	3.29	3.95	4.72

Classes 1,3,5 = Experimental group

Class 2 = Control group

Table 4.3 presents the average score percentage of students' before-class participation, class attendance and in-class participation. Each of them contained 5% out of the entire evaluation criteria. Apparently, regarding the experimental group, class 5 tended to have the lowest scores in these three criteria which they were assigned to undertake self-study outside the classroom, attend classes, and participate in-class activities.

Summary from the researcher observation

As reported in the researcher observation, Table 4.4 summarises the results as follows.

Table 4.4 Summary of the researcher observation

Themes	Summary of the researcher observation
Before-class participation	<p>Most of the students took responsibility in doing the assigned online self-study.</p> <p>Almost every group was responsible and did well for the group assignment to do a presentation for the before-class self-study.</p>

Themes	Summary of the researcher observation
In-class participation	<p>Students were active and enthusiastic in group work.</p> <p>Teacher facilitation and monitoring are necessary during activities.</p> <p>Student's need of clear guided instructions before performing tasks or activities</p> <p>Additional questions were set up and some activities were adjusted to help guide students to complete the tasks.</p> <p>In the blended learning environment:</p> <ul style="list-style-type: none"> - Computer room used for the instruction - Easy and convenient to monitor during activities - Large class size in some classes and time limits might cause some difficulties in thorough class monitoring. <p>In traditional classroom, the physical setting, e.g. position of desks and chairs, may hinder the teacher's access to monitor during class activities.</p> <p>No technical problems found during the course</p> <p>Using social networking platforms is convenient and interesting for students as they can receive simultaneous feedback and comments from peers and teacher.</p> <p>Students are quite acquainted with computer use, online and social networking platforms.</p>
Wrap-up session	<p>Game-based activities are effective and participative for students.</p> <p>Time constraints often cause difficulties in the wrap-up activities.</p> <p>Convenient to use online end-of-unit quizzes</p>
Students' overall behaviour and learning outcomes	<p>Characteristics, responsibility, attentiveness, and motivation differed between the academic majors or classes.</p>

To conclude, during the course, no technical problems were found or encountered as students were equipped with sufficient skills of computer use and access to online information. Based on my opinion, setting up the learning environment at the language lab was more convenient in terms of computer and online support to students and the teacher. The seating was more accessible than in the traditional classroom where one-to-one interaction was difficult to access for monitoring, especially when the class size was large. Students were likely to be more enthusiastic and active working in groups than in pairs and participating in game-based wrap-up activities. However, the technology-mediated content and end-of-unit

quizzes were required to be carefully created and double-checked before launching. Seemingly, students' behaviour differed based on different classes and majors, which reflected through the results as shown in the course evaluation. This might indicate that students' differences in characteristics are likely to affect their attentiveness to the study and participation in assigned activities.

3. Questionnaire

In the last week of the course, the participants from the experimental group were kindly invited to do an online questionnaire through the link sent through their online messenger. Of the study sample, 31 students completed this questionnaire which consisted of five sections: (1-Personal information, 2-Attitudes towards blended learning, 3-Perceptions towards blended learning, 4-Perceptions towards blended learning instruction during the course, 5-Suggestions for blended learning course). Apart from using descriptive statistics, in sections 2-5, the reliability of the questionnaire was computed to indicate its overall quality. The reliability test indicated the value of the Cronbach's Alpha at .86, which means that the reliability of overall items was at a high level and considered as an appropriate tool. Regarding the quantitative data from the questionnaire, the responses were reported in frequency with percentage and were analysed by mean and S.D. The questionnaire results are then presented based on the five sections (1-5) mentioned above.

Section 1: Personal information

In this section, the respondents were asked about their personal information (age, year of study, the length of their studying English, number of English courses taken in the past years, computer skills, and experience for online or blended learning courses). As presented with frequency and percentage in Table 4.5, most respondents' age ranged from 21-24, and their year of study varied from Year 3, 4 and higher than 4. Furthermore, most of them have learnt English for more than 10 years, and have taken approximately 2-4 English courses at the university in the past years. Regarding their computer knowledge, more than 90% possessed from the average to good skill levels. In terms of their experience related to

online courses, 58% of them rarely participated in these courses, while 41.9% had the online-course experience at a moderate level. Similarly, regarding their experience with blended learning courses, almost all respondents (87.1%) had this experience at slight to moderate levels, with 9.7% who never involved in these courses, and only one respondent who had a blended learning experience at a great extent.

Table 4.5 Respondents' general information

Information	Responses	Frequency (N=31)	%
Year of study	Year 3	15	48.4
	Year 4	10	32.3
	Higher than Year 4	6	19.4
Age	21-24	30	96.8
	Over 25	1	3.2
Years of studying English	Less than 10 years	7	22.6
	10-15 years	15	48.4
	More than 15 years	9	29
Number of English courses taken in the past years	2	10	32.3
	3	10	32.3
	4	11	35.5
Computer knowledge	Poor	1	3.2
	Average	16	51.6
	Good	14	45.2
Experience with online courses	Not at all	9	29
	Very little	9	29
	Somewhat	13	41.9
	To a great extent	-	-
Experience with blended learning	Not at all	3	9.7
	Very little	10	32.3
	Somewhat	17	54.8
	To a great extent	1	3.2

Section 2 Attitudes towards blended learning

Table 4.6 reveals the results from the aspects of respondents' attitudes towards blended learning. The majority of those who responded to this section felt positive about studying in the blended learning environment. Based on items 1 - 5, more than 80% of them indicated that the blended learning setting enhanced their learning and engagement with the course. Furthermore, apart from blended learning encouraging them to be more positive about learning English, they required more English courses, which incorporated this approach for learners. Therefore, in item 6, they

disagreed to take typical courses without blended learning instruction. Moreover, at the end of the course, 70 - 80% of the respondents viewed the blended learning approach in a positive way because it could give them opportunities to practice and communicate with peers or instructor outside the classroom, including better learning achievement and motivation.

Table 4.6 Respondents' attitudes towards blended learning

Sections	Items		Strongly agree	Agree	Disagree	Strongly disagree	Average			Results
			Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Mean	S.D.	N	
Section 2: Attitudes towards blended learning	1	I think I learned more in this blended learning (BL) environment.	12 (38.7)	19 (61.3)	–	–	3.39	.50	31	Strongly agree
	2	I am more engaged with the course in this blended learning environment.	10 (32.3)	20 (64.5)	1 (3.2)	–	3.29	.53	31	Strongly agree
	3	I would like more English courses to be organised in blended learning environment	15 (48.4)	16 (51.6)	–	–	3.52	.51	31	Strongly agree
	4	I would recommend the blended learning course to friends or associates.	13 (41.9)	17 (54.8)	–	1 (3.2)	3.35	.66	31	Strongly agree
	5	The blended learning course makes me more positive about learning English.	9 (29.0)	21 (67.7)	1 (3.2)	–	3.26	.51	31	Strongly agree
	6	I prefer a more typical course without blended learning	3 (9.7)	5 (16.1)	19 (61.3)	4 (12.9)	2.23	.81	31	Disagree
	7	Blended learning gives me more or better opportunities to communicate with the instructor.	4 (12.9)	20 (64.5)	6 (19.4)	1 (3.2)	2.87	.67	31	Agree
	8	Blended Learning gives me a chance to practice outside the classroom at my own pace.	7 (22.6)	22 (71.0)	2 (6.5)	–	3.16	.52	31	Agree
	9	Blended learning course could bring me more motivation in studying English.	3 (9.7)	26 (83.9)	2 (6.5)	–	3.03	.41	31	Agree
	10	I feel a greater sense of satisfaction and achievement when learning English in a blended learning environment.	8 (25.8)	22 (71.0)	1 (3.2)	–	3.23	.50	31	Agree

Section 3 Perceptions towards blended learning

This section of the questionnaire required respondents to give information on their perceptions towards blended learning. From Table 4.7, the overall response to this section was positive, that is, the blended learning

approach is perceived as the improvement for their vocabulary learning, a convenient way for an in-class and out-of-class interaction with friends or instructors, an appropriate balance between face-to-face and online learning, the flexibility of their learning, and their learning improvement through blended learning activities and collaboration. The respondents strongly viewed that a teacher's feedback from the blended learning course assisted their vocabulary learning, rated at 82.26%. However, 80.65% of them agreed that self-discipline is an important factor in learning in the blended learning environment.

Table 4.7 Respondents' perceptions towards blended learning

Sections	Items		Strongly agree	Agree	Disagree	Strongly disagree	Average			Results
			Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Mean	S.D.	N	
Section 3: Perceptions towards blended learning	1	Blended learning courses are useful and interesting.	7 (22.6)	24 (77.4)	–	–	3.23	.43	31	Agree
	2	The blended learning course has improved my English vocabulary learning.	7 (22.6)	23 (74.2)	1 (3.2)	–	3.19	.48	31	Agree
	3	The blended learning course provides an appropriate balance between face-to-face and online learning.	7 (22.6)	22 (71.0)	2 (6.5)	–	3.16	.52	31	Agree
	4	Blended learning provides me additional materials to catch up with the course content.	6 (19.4)	24 (77.4)	1 (3.2)	–	3.16	.45	31	Agree
	5	It is easy to interact with friends or the teacher synchronously and asynchronously.	7 (22.6)	23 (74.2)	1 (3.2)	–	3.19	.48	31	Agree
	6	Blended learning provides flexibility for my learning (I can make my own decision of how much, when or where to learn).	7 (22.6)	23 (74.2)	1 (3.2)	–	3.19	.48	31	Agree
	7	In blended learning environment, I have to be more self-disciplined in order to learn.	8 (25.8)	22 (71.0)	1 (3.2)	–	3.23	.50	31	Agree
	8	Teacher's feedback from the blended learning course supports my vocabulary learning.	10 (32.3)	20 (64.5)	1 (3.2)	–	3.29	.53	31	Strongly agree
	9	The collaboration through blended learning activities improves my learning.	7 (22.6)	24 (77.4)	–	–	3.23	.43	31	Agree

Sections	Items		Strongly agree	Agree	Disagree	Strongly disagree	Average			Results
			Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Mean	S.D.	N	
10	Blended learning course helps increase the rate of my vocabulary knowledge retention.		5 (16.1)	21 (67.7)	5 (16.1)	–	3.00	.58	31	Agree

Section 4 Perceptions towards blended learning instruction during the course

In section 4, the respondents were asked to reflect on their perceptions towards instruction of the blended learning course, in terms of learning objectives, lessons, tasks or activities, quizzes and materials, giving peer feedback, and the use of technology.

Table 4.8 Respondents' perceptions towards the blended learning course

Sections	Items		Strongly agree	Agree	Disagree	Strongly disagree	Average			Results
			Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Mean	S.D.	N	
Section 4: Perceptions towards the blended learning instruction during the course	1	The learning objectives are clearly stated in each blended learning lesson.	5 (16.1)	26 (83.9)	–	–	3.16	.37	31	Agree
	2	Blended Learning lessons are presented logically and clearly.	7 (22.6)	24 (77.4)	–	–	3.23	.43	31	Agree
	3	Tasks and activities are explained or instructed clearly.	11 (35.5)	20 (64.5)	–	–	3.35	.49	31	Strongly agree
	4	The organisation of each lesson is easy to follow through.	8 (25.8)	22 (71.0)	1 (3.2)	–	3.23	.50	31	Agree
	5	The quizzes and materials enhance my vocabulary learning.	8 (25.8)	22 (71.0)	1 (3.2)	–	3.23	.50	31	Agree
	6	Practice or reviews in this blended learning course are effective to use in improving my learning.	10 (32.3)	20 (64.5)	1 (3.2)	–	3.29	.53	31	Strongly agree
	7	I participate in giving peer feedback regularly.	8 (25.8)	23 (74.2)	–	–	3.26	.45	31	Strongly agree
	8	I use peer feedback to improve my learning.	6 (19.4)	23 (74.2)	2 (6.5)	–	3.13	.50	31	Agree
	9	It is easy to work collaboratively with other students in a group project.	12 (38.7)	19 (61.3)	–	–	3.39	.50	31	Strongly agree
	10	The use of technology (web-based content, educational platforms) is incorporated properly for this course.	15 (48.4)	15 (48.4)	1 (3.2)	–	3.45	.57	31	Strongly agree

As shown in Table 4.8, more than 81% strongly agreed with clearly-explained tasks and activities, practice or reviews used in the blended learning environment, and the use of technology incorporated in this course which was rated the highest at 86.29%. In addition, they had high participation in giving regular peer feedback, and viewed that the course gave an opportunity to collaborate conveniently with other students in a group project. Furthermore, nearly 80% of them had positive views towards clearly-stated learning objectives, the organisation of presented lessons, quizzes and course materials, and peer feedback used to improve their learning.

Section 5 Suggestions for the blended learning course

In the last section, the respondents were asked to view the suggestions for the blended learning course. The results, in Table 4.9, obtained from the questionnaire can be seen that approximately 71-78% of the respondents agreed with the suggestions for a prior training session for the blended learning course, the additional proportion of online learning, more face-to-face interaction with teacher and classroom practice, more out-of-class communication with instructor, the probability of higher use of students' own IT device, less complicated course content, and preferred traditional teacher-led lesson to watching from a video. Furthermore, 83.06% of them strongly viewed that the internet connection should be more effective during the blended learning course as it was the important tool incorporated with online quizzes, games and activities during instruction.

Table 4.9 Respondents' suggestions for the blended learning course

Sections	Items		Strongly agree	Agree	Disagree	Strongly disagree	Average			Results
			Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Mean	S.D.	N	
Section 5: Suggestions for the blended learning course	1	There should be a training session for a blended learning course before it starts.	6 (19.4)	21 (67.7)	4 (12.9)	–	3.06	.57	31	Agree
	2	The internet connection should be improved.	13 (41.9)	16 (51.6)	1 (3.2)	1 (3.2)	3.32	.70	31	Strongly agree
	3	The proportion of online learning should be increased.	7 (22.6)	17 (54.8)	6 (19.4)	1 (3.2)	2.97	.75	31	Agree

Sections	Items	Strongly agree	Agree	Disagree	Strongly disagree	Average			Results
		Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Mean	S.D.	N	
4	There should be more face-to-face interaction with teacher.	6 (19.4)	19 (61.3)	4 (12.9)	2 (6.5)	2.94	.77	31	Agree
5	There should be more classroom practice.	6 (19.4)	20 (64.5)	5 (16.1)	–	3.03	.61	31	Agree
6	There should be more after-class online practice.	7 (22.6)	16 (51.6)	8 (25.8)	–	2.97	.71	31	Agree
7	There should be more communication with teacher outside the classroom.	6 (19.4)	22 (71.0)	3 (9.7)	–	3.10	.54	31	Agree
8	It would be better to use students' own device than the facilities at the university.	5 (16.1)	19 (61.3)	5 (16.1)	2 (6.5)	2.87	.76	31	Agree
9	The course content should be less difficult.	5 (16.1)	17 (54.8)	9 (29.0)	–	2.87	.67	31	Agree
10	It would be better to watch a traditional teacher-led lesson than a lesson video.	5 (16.1)	22 (71.0)	4 (12.9)	–	3.03	.55	31	Agree

Summary of the questionnaire results

To conclude the questionnaire results, most of the respondents had a positive view towards the blended learning setting which motivated them in studying English courses and vocabulary enhancement. It also offered them good opportunities to have an in-class interaction, collaboration and out-of-class communication with other classmates and the teacher whose feedback was useful for their vocabulary learning. They agreed that, regarding the online content, students' self-discipline was very important to complete self-study or online task assignments. In terms of learners' participation, most of them were satisfied with the presentation of tasks and activities of which objectives were clearly stated, including the peer and teacher feedback they received to improve their learning. Students provided some suggestions to the course, for example, an introduction or a training session prior to the blended learning course should be conducted. Moreover, they recommended additional online content, classroom practice, and face-to-face interaction or out-of-class communication with teacher should be organised. In terms of computer facility, they suggested the possibility of using their own IT device, and it is very important for the

internet connection to maintain effective when completing online activities, such as online quizzes, games, or streaming videos. Table 4.10 summarises the key results from the questionnaire.

Table 4.10 Summary of questionnaire results

Attitudes towards blend learning	Perceptions towards blend learning	Perceptions towards blend learning instruction	Suggestions for the blended learning course
Positive attitudes in terms of: more opportunities to practice and communicate with peers and teacher more opportunities for better learning and motivation	Positive perceptions in terms of: vocabulary improvement convenience for in-class and out-of-class interaction learning flexibility collaboration	Positive about the organisation and structure of the instruction High participation in giving peer feedback Having an opportunity to collaborate with friends	A prior training session for the blended learning course Still demanding face-to-face interaction with instructors Considering complexity of the course content Use of students' own IT devices Importance of effective internet connection for the course

4. Student interviews

In this research, audio-recorded interviews were conducted with students who took the course. In the last week of the course, ten students were randomly selected to participate in the interview. They were asked about the questions or their opinions related to the blended learning course and its feasibility in the aspects of, such as, learning in the blended learning environment, improvement, in-class participation, out-of-class practice, and vocabulary knowledge retention. Therefore, based on the coding of the students' statements from the interview transcriptions, the key results are summarised into three main categories: the blended learning course, students' participation and practice, and knowledge retention.

4.1 The blended learning course

With respect to the course, the interviewees were asked to express their ideas or opinions towards this course in terms of content, improvement, preferences, suggestions, and applicability of the approach to other

subjects. In this main category, the key results are reported by dividing into five themes: students' previous ideas about the course content, preferences for this course, students' increase in vocabulary, opinions and suggestions towards the course, proportion of a blended learning course (between face-to-face and online content), and applicability of blended learning into other courses.

4.1.1 Students' previous ideas about the course content

When students were asked about their ideas about the subject before the course started, they viewed that it was probably relevant to work, communication, a business company, factory work, industries, conversations for industries, or in engineering-related work contexts.

4.1.2 Preferences for this course

Regarding the students' preferences to the course, they were positive with studying at the language lab which provided them a computer device for an individual student. They viewed that it was convenient and interactive to study by viewing the content on the computer screen, including taking online quizzes. In terms of the class size, some interviewees preferred a small number of students per class as the teacher could monitor their performance effectively. Based on their views, the online platforms incorporated in this course were not complicated for them to use, especially the social networking platform which was convenient for them to follow up the lesson summary. Asking about the classroom content, they agreed that the amount of assigned activities and tasks was appropriate, and the activities offered more opportunities to practice conversations or express opinions and participate in in-class activities with friends. For example, some informants reported:

"I also like the computer room facility which allows us to watch the content on an individual computer screen...."

"I prefer studying at the computer lab to the traditional classroom. I once joined the other class. There were a lot of students, which I don't like. I prefer our class which is smaller."

"I like when there are group activities and games sometimes. There are not too many or too few of them..."

“I think the online platforms provide me learning flexibility in which I can do the before-class assignments anywhere.”

4.1.3 Students’ increase in vocabulary knowledge

When asking about their vocabulary knowledge after learning, most of the students viewed that their vocabulary knowledge increased, while a few of them revealed that it increased slightly. The interviewees revealed that they gained new vocabulary and grammar points. They also expected that the taught vocabulary knowledge could be useful for the future use in organisations and their career.

4.1.4 Opinions and suggestions towards the course

With respect to their opinions and suggestions to the course, some Engineering students viewed the content as being seemed to be slightly irrelevant to their background. They suggested that the course might not depend much on the textbook – more authentic materials, which could be used in real contexts, should be added to the course. Some students required more listening tasks and expected the content to be more relevant to daily life (e.g. everyday conversation in business or organisations). Some of them complained that class time was spent too excessively in teaching each week. Regarding end-of-unit quizzes, they preferred to have more multiple choices in the quizzes rather than fill-in-the-blank type. Regarding these issues, some interviewees said:

“I think the content seems to be far from my background knowledge.

They should focus on word use in everyday life, communication in business or technical knowledge”.

“...it might be good to watch a video of an authentic work situation which enables us to use the language in the real contexts. Sometimes, course books might be uninteresting.”

“...I don’t like when I had to type in the answers during the quizzes. I prefer multiple-choice because typing might cause me to be too exhausted.”

4.1.5 Proportion of a blended learning course (between face-to-face and online content)

Asking them to weigh the proportion of the combination between face-to-face and online methods, students suggested the flexible arrangement

between online and face-to-face sessions. Most of them voted 60-70% for the face-to-face teaching approach and 30-40% for incorporating online content into a blended learning course, while a slight proportion voted for the majority of the traditional method over 20% of the online content. Regarding the proportion of blended learning instruction, some participants commented:

“I think 70% for face-to-face and 30% for online out-of-class assignments which are homework and exercises. In my opinion, students prefer a face-to-face communication or interaction in the classroom.”

“I think 80% for the in-class session and 20% for the online study. Learning face-to-face with the teacher is easier than self-studying because I may not succeed in learning independently due to lack of self-discipline and self-control.”

“I still prefer the majority of the face-to-face method because I can ask questions whenever I am in doubt. But regarding the online self-study, it might be slightly difficult to gather questions and wait for the answers...”

Most of them still required the face-to-face interaction as frequently as possible, as a means to summarise or wrap up the taught content in class and good opportunities for a question session. Moreover, online content may play a minor role in the course, which might be in the form of lesson reviews on an online platform. The online content should be simple, understandable and enjoyable for learners. Live online review could be an option for a synchronous communication between students and instructors. To access the online content, it was good to set up deadlines or rules to discipline the users or students. Students viewed that providing online self-study in before-class session prepared and helped motivate them for the in-class session, and they were in favour of a number of in-class tasks and activities.

4.1.6 Applicability of blended learning into other courses

Regarding their opinions on the applicability of blended learning into other academic courses, many of them thought that incorporating the use of technology into every course was very important and challenging, as one informant commented:

“I think it seems suitable, for example, learners can re-watch the in-class taught lessons outside the classroom. This way they can also review because teachers might not provide sufficient time for them during class time.”

Meanwhile, another interviewee said:

“There should not be the online method. The in-class instruction is better, especially the calculus subject. It might be okay if the review was presented online. But for the new content, face-to-face instruction is more useful.”

Hence blended learning was suitable for academic courses, but not applicable for some subjects. For example, in mathematics or engineering courses, an online platform might be suitable for reviews or learning from additional examples, but it would be more understandable to study new content through a face-to-face interaction which was considered important for them because some students lacked self-discipline when managing online self-study assignments independently; therefore, the face-to-face teaching approach was still required. Recorded content on an online platform allowed them to review, re-watch outside the classroom, or ask questions through the online communication. They also viewed that online practice and review were necessary for language courses.

4.2 Students' participation and practice

In this category, the interviewees were asked to give opinions regarding their self-discipline towards assigned materials and practice. The results are divided into four themes: class participation, before-class self-study assignments, end-of-unit quizzes, and out-of-class practice.

4.2.1 Class participation

Most of them were always present at class and participated in all activities during the class time. They preferred to participate in group activities, and some of them were occasionally slow in participation due to fatigue.

4.2.2 Before-class self-study assignments

Regarding self-study assignments in the before-class session, most of the interviewees viewed that the assignments were useful and allowed

students to estimate their level before continuing to the in-class session, as one participant said:

“It quite works for me since it enables me to know the level of my knowledge before the in-class session.”

Most of them always completed the assignments before class, while some students often finished the tasks before the class started, due to the reason of forgetfulness or their heavy study loads.

4.2.3 End-of-unit quizzes

Regarding their opinions on end-of-unit quizzes, one informant commented the students viewed that the quizzes helped them review and retain some taught words. For example, some participants said:

“I think they partly helped.”

“I agree because it summarised or reviewed at the end of lesson.”

“I think they partly help and interest me to memorise the taught words.”

However, some of them prefer the online quizzes to provide more multiple choices, as one informant commented:

“I also like the online quizzes that we don’t have to type much, but I prefer to have more multiple-choices because they will probably help me to recall more of the taught words.”

Another interviewee also said:

“But I don’t like when I had to type in the answers during the quizzes. I prefer multiple-choice because typing might cause me to be too exhausted.”

Overall, students thought the quizzes provide useful summary and reviews after lessons, and partially help memorise, especially when the taught words were of their interests, this would bring better word retention.

4.2.4 Out-of-class practice

Asking about their spending time outside the classroom to practice or review, they admitted that they occasionally did it, but tended to practice more through the in-class activities, and tended to review vocabulary at their own pace. They always followed up the lesson summary posted to the closed group on the social networking platform. Some students revealed

their techniques in reviewing taught vocabulary, for example, some interviewees said:

“After class, sometimes I posted the taught words on the timeline or as a caption on my Facebook.”

“I like reading Harry Potter in the English version, so that it helps my vocabulary learning.”

“I always take notes of the taught words, and I review them in my free time.”

In general, they attempted to view or use the taught words as often as possible, by posting them on their social networking timeline, taking notes of the words, or reciting them during the exams. Some students put efforts in to enhance new vocabulary knowledge by reading English novel books.

4.3 Knowledge retention

With respect to the knowledge retention aspect, the students were interviewed to express their opinions regarding their vocabulary knowledge retention during the term time and factors affected the retention. The results of the interview are shown in two following themes: vocabulary knowledge retention during the course and factors affected their vocabulary knowledge retention.

4.3.1 Vocabulary knowledge retention during the course

Regarding their vocabulary knowledge retention during the course, they revealed that they could retain the taught words to some extent, but not entirely. They were uncertain about recalling all the words learnt before the midterm exam, but they were probably able to recall some of them. So, they occasionally looked up in the course book to recollect the meaning. They also added that the rate of the word retention relied on the frequent use or encounters with vocabulary in everyday life. Without regular use of taught words, they might not be retained, as one participant admitted that lack of regular use or review of vocabulary takes part in knowledge retention as he said:

“Without regular word review, I tend to forget those words.”

Another interviewee added:

“I agree. Likewise, we use Thai language to communicate every day, so we have opportunities to use vocabulary without reviewing. So, we tend to forget the English vocabulary because we don't use it very often.”

Hence, it can be seen that opportunities to use taught words and frequency that students encounter the vocabulary in daily life take a major role in their vocabulary knowledge retention.

4.3.2 Factors affected their vocabulary knowledge retention

As previously stated the factors which affected students' vocabulary learning and word retention, other interviewees also added:

“Environment in everyday life, where we speak Thai all the time, may cause me fewer opportunities to use English vocabulary, and lack of regular word review also causes difficulties in retaining vocabulary knowledge.”

“I think the intrinsic motivation of mine is the main factor in vocabulary knowledge retention.”

“The first impression of the word that I learnt, including associating it with something else or contexts, such as business, finance, or investment, may help retain at a better rate.”

“I think it probably depends on an individual learner. Some students might not pay much attention to what is being taught at that moment. Or sometimes they learn vocabulary, but it might be forgotten at the end of the class due to lack of use with the taught words.”

Therefore, the factors that led to the decrease in vocabulary knowledge retention were insufficient opportunities to use vocabulary in everyday life, lack of regular review of taught words, inadequate attention while studying, an individual learner's characteristics, lack of word association to something else, lack of motivation to learn or memorise word meaning. Therefore, what assisted them to retain the taught words were words seen regularly in quizzes or tests, easy and frequently used words, revision by teacher, first impression of the taught words, or associating them with other things. To familiarise with the taught words, they used some techniques, such as posting on their social networking timeline, reading academic papers, and making sentences with the taught words.

Summary of student interviews

To conclude, the students were positive about the classroom environment in this course as it offered them convenience and interactive learning through the lessons. They were satisfied with the amount of assignments and tasks in the course, and with activities which offered them opportunities for in-class participation with peers and interaction with teacher. In terms of vocabulary learning, they expected that the vocabulary learnt would be useful for their work in the future. Regarding the course content, they viewed that it may not correspond with their background or majors. They also expected the content to be more relevant to their daily life which they could use in business or organisations. With respect to the balance between online and face-to-face content, they still viewed the importance and the majority of face-to-face interaction which was suitable for learning new content and for a question-and-answer session. They preferred the online content organised as review or additional course materials which could be re-watched and should be simple, useful and understandable for them. They also suggested that there should be deadlines or rules to control learners' self-disciplines when completing the online tasks or self-study.

In regard to their participation, they were likely to participate in every activity and take responsibility in completing before-class self-study. They also considered end-of-unit quizzes as way of vocabulary review and part of word retention. However, many of them occasionally had vocabulary practice outside the classroom, and some of them created their own techniques to assist their vocabulary enhancement and retention, such as taking notes, posting on their social networking timeline, reciting, and reading English language books. From the beginning to the end of the course, students were likely to be able to retain part of taught vocabulary. They could recall some of the taught words which were frequently seen or used, while the words which were not regularly used were likely to be forgotten. Based on their viewpoints, factors affected their vocabulary knowledge retention could be insufficient use and review of the taught words, lack of motivation or inattentiveness to learning, lack of word

association, and individual learners' characteristics. Table 4.11 shows the summary of key results from the student interview.

Table 4.11 Summary of student interviews

Themes	Summary of interview results
Opinions and suggestions for the blended learning course	<p>Convenience in studying at the computer lab which provides a PC for an individual student</p> <p>Students' familiarity with computer use and online platforms</p> <p>Instruction offered opportunities to interact with peers and teacher, and increasing vocabulary size.</p> <p>Requiring more authentic materials related to their daily life and real contexts</p> <p>Excessive consumption of class time</p> <p>Students' preference in the face-to-face interaction to the online method</p> <p>Online content could be used as a review.</p> <p>Necessary to set up deadlines or rules to control the access of online assignments</p> <p>Blended learning instruction is applicable to academic courses, but probably suitable for some particular subjects.</p>
Students' participation and practice	<p>Most students participated in all activities, prefer group activities, and took responsibility in before-class assignments.</p> <p>End-of-unit quizzes' help in reviewing taught words</p> <p>Preference for end-of-unit quizzes with more multiple choices</p> <p>Students tended to practice vocabulary use occasionally and mostly review it at their own pace.</p> <p>Students' techniques in retaining vocabulary varied.</p>
Vocabulary knowledge retention	<p>Not certain about recalling taught words</p> <p>Regular use and encounters with vocabulary affect knowledge retention</p> <p>Factors affecting knowledge retention, e.g. word association, regular use/ review of taught words, motivation to learn vocabulary, and encounters with vocabulary</p>

4.2 Summary of results to this chapter

This chapter presents the findings of the current study based on those seven research questions. Tables 4.12 and 4.13 provide summary of all quantitative and qualitative results, respectively, in relevant details to variables, research questions, subjects and research tools. In the next chapter, the discussion of results will be explained based on the same research questions as presented from this chapter.

Table 4.12 Summary of quantitative results (RQs 1-6)

Quantitative results									
Variables	Research Questions	Subjects	Research tools & Summary of the results (RQs 1-6)						
			PET (65 items)	Pre-test (130 items)	Post-test (130 items)	Delayed test (130 items)	Gain scores: pre-test - post- test	Gain scores: pre-test - delayed test	Gain scores: post-test - delayed test
Increasing vocabulary knowledge	RQ1: To what extent does blended learning enhance students' vocabulary knowledge?	Experimental group vs. Control group	-	The control group gained higher vocabulary knowledge at the beginning.	The control group did better in post-test scores.	-	The control group gained greater change in vocabulary knowledge.	-	-
Vocabulary knowledge retention	RQ 2: To what extent do students retain the vocabulary knowledge?	Experimental group vs. Control group	-	The control group had higher vocabulary knowledge at the beginning.	-	Both groups' vocabulary knowledge retention decreased similarly.	-	During the course both groups retained vocabulary knowledge similarly.	After the course ended, both groups' vocabulary knowledge decreased at an approximate level.
Increasing vocabulary knowledge Vocabulary knowledge retention	RQ 3: Are male students' test scores different from female students'?	male -female (Experimental) + male-female (Control)	Females in the experimental group had better language proficiency. Similar language proficiency between the two genders in control group	Females from both groups had higher vocabulary knowledge at the beginning of the course.	Females from the experimental group performed better than males. Males and females in control group had the similar level post-test scores.	Females in the experimental group perform better in retaining vocabulary knowledge. Both genders in the control group retained vocabulary knowledge similarly.	Females and males from both groups gained similar change in vocabulary knowledge.	Females in the experimental group retained greater vocabulary knowledge during the course. Similar level of vocabulary knowledge retention during the course in control group	Males and females from both groups gained similar decrease in vocabulary knowledge retention after the course ended.

Table continued

Quantitative results

Variables	Research Questions	Subjects	Research tools & Summary of the results (RQs 1-6)						
			<i>PET</i> (65 items)	<i>Pre-test</i> (130 items)	<i>Post-test</i> (130 items)	<i>Delayed test</i> (130 items)	<i>Gain scores: pre-test - post-test</i>	<i>Gain scores: pre-test - delayed test</i>	<i>Gain scores: post-test - delayed test</i>
Increasing vocabulary knowledge	RQ 4: Are engineering major students' test scores different from architecture major students'?	engineering students vs. architecture students	Both majors had similar language proficiency.	Both majors had similar vocabulary knowledge at the beginning.	Engineering students performed better in post-test scores.	Engineering students gained greater change in vocabulary knowledge.	-	-	-
Increasing vocabulary knowledge Vocabulary knowledge retention	RQ 5: To what extent do students' test scores differ between the classes?	All registered classes	Students from different classes had different level of language proficiency. Some particular classes share similar language proficiency. Classes 1 and 5 had an approximate level of language proficiency. Class 1 had the lowest language proficiency. Class 2 had the highest language proficiency.	Students from different classes had different vocabulary knowledge at the beginning. Classes 2, 3 and 5 had the similar level of vocabulary knowledge at the beginning. Class 1 had the lowest pre-existing vocabulary knowledge.	Class 5 gained the lowest in post-test. Classes 2 and 3 gained the highest in the post-test scores. Comparing in the experimental group, class 3 had the highest post-test scores.	Class 3 gained the highest delayed test scores	Class 3 gained the highest change in vocabulary knowledge.	Classes 2 and 3 gained similar vocabulary knowledge retention during the course.	All classes had a similar decrease in vocabulary knowledge retention after the course ended.

Table continued

Quantitative results

Variables	Research Questions	Subjects	Research tools & Summary of the results (RQs 1-6)							
			<i>PET</i> (65 items)	<i>Pre-test</i> (130 items)	<i>Post-test</i> (130 items)	<i>Delayed test</i> (130 items)	<i>Gain scores: pre-test - post-test</i>	<i>Gain scores: pre-test - delayed test</i>	<i>Gain scores: post-test - delayed test</i>	
			Classes 2 and 3 had similar language proficiency							
Increasing vocabulary knowledge Vocabulary knowledge retention	RQ 6: To what extent are there correlations between students' language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge and vocabulary knowledge retention?	Experimental and control groups	Language proficiency has a positive high correlation with pre-existing vocabulary knowledge, and knowledge retention.	Pre-existing vocabulary knowledge has a positive high correlation with language proficiency and vocabulary knowledge retention.	Increasing vocabulary knowledge has: a moderate correlation with language proficiency; a small correlation with pre-existing vocabulary knowledge; and a high correlation with vocabulary knowledge retention.	Vocabulary knowledge retention has a high correlation with language proficiency, pre-existing vocabulary knowledge and increasing vocabulary knowledge.	-	-	-	

Table 4.13 Summary of qualitative results (RQ 7)

<i>Qualitative results</i>						
Variable	Research Question	Subjects	Research tools & Summary of the results (RQ 7)			
			<i>Questionnaire</i>	<i>Interview</i>	<i>Independent teacher observations + interview</i>	<i>Researcher observation</i>
Feasibility of the blended learning approach	RQ 7: To what extent is the use of a blended learning approach feasible?	Respondents from experimental group	Positive perceptions and attitudes towards the blended learning instruction Blended learning provides peer collaboration, interaction with peers and teachers, learning flexibility, and convenience in in-class and out-of-class communication. Suggestions taken into account: - The majority of face-to-face interaction needed - Level of content difficulty into account - A prior training course for the blended learning course - Effective Internet connection	-	-	-
		Randomly selected students (Experimental group)	-	Preferences for: - Studying at the computer lab provided a PC for an individual student - Major proportion of face-to-face instruction, with online method used for a review - Relevant content to student's	-	-

Table continued

Qualitative results

Variable	Research Question	Subjects	Research tools & Summary of the results (RQ 7)			
			Questionnaire	Interview	Independent teacher observations + interview	Researcher observation
				background knowledge - More multiple choices in quizzes Occasional vocabulary practice outside the classroom, with various techniques in memorising word meaning Retaining vocabulary knowledge slightly Regular use and encounters with vocabulary affect knowledge retention		
		Two English language instructors	-	-	Overall, the activities and instruction are appropriate, with clear objectives and good rapport with students. Feasible for English language courses which need practice Requiring teachers' willingness for hard work in material preparation, and students' readiness to take responsibility	-

Table continued

Qualitative results

Variable	Research Question	Subjects	Research tools & Summary of the results (RQ 7)			
			Questionnaire	Interview	Independent teacher observations + interview	Researcher observation
					and participation Suggestions for: - using authentic assessment - focus outcomes related to application in real contexts - being concerned with level of content difficulty and learners' characteristics - selective use of technology for the lesson	
		Students from all classes	-	-	-	Access for class monitoring may be easier to do at the computer lab in the blended learning environment. The majority of the participants took responsibility for before-class assignments, in-class participation, and other out-of-class assignments. Students needed teacher facilitation and clear guided instructions during activities.

Table continued

Qualitative results

Qualitative results						
Variable	Research Question	Subjects	Research tools & Summary of the results (RQ 7)			
			Questionnaire	Interview	Independent teacher observations + interview	Researcher observation
						<p>Students participated well in group work and game-based wrap-up activities.</p> <p>No technical problems found during instruction.</p> <p>Students are familiar with using technology and online platforms</p> <p>Learners' behaviour, characteristics and motivation varied between the different classes and academic majors.</p>

5. Discussion

5.1 Introduction

This current study aimed at investigating students' increase in vocabulary knowledge and vocabulary knowledge retention with the use of a blended learning approach, including its feasibility in EFL classrooms at the tertiary level. The research was conducted at a university in Thailand, using a quasi-experimental design with an English course during the first semester of academic year 2018. As results were revealed and presented in the previous chapter, discussion of the results will be made in the following sections of this chapter. Figure 5.1 shows the diagram of the discussion which will be presented, based on research questions (RQ) 1-7, in regard to the study variables and relevant aspects: vocabulary learning, vocabulary knowledge retention, gender differences, variation between academic majors, differences between the registered classes, relationships between language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge and vocabulary knowledge retention, and feasibility of the blended learning approach in EFL classrooms. At the end of this chapter, a summary of the discussion will be made based on the three dependent variables of this research: students' increase in vocabulary knowledge, knowledge retention and feasibility of blended learning.

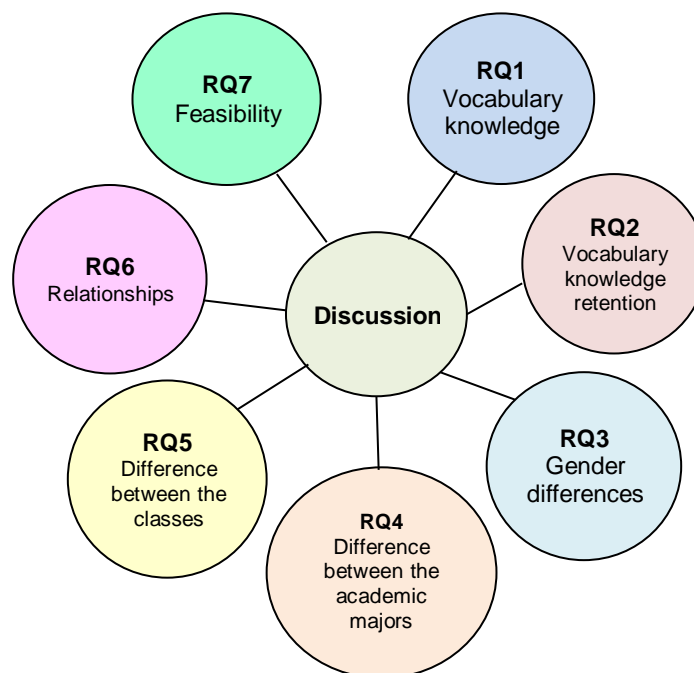


Figure 5.1 Discussion based on research questions 1-7

Research question 1

RQ1: To what extent does blended learning enhance students' vocabulary knowledge?

The first question in this study sought to examine the students' increasing vocabulary knowledge, between the experimental and control groups, through blend learning instruction which employed the flipped classroom to engage them in learning during the English course. Figure 5.2 summarises the key results in students' vocabulary knowledge between the two groups.

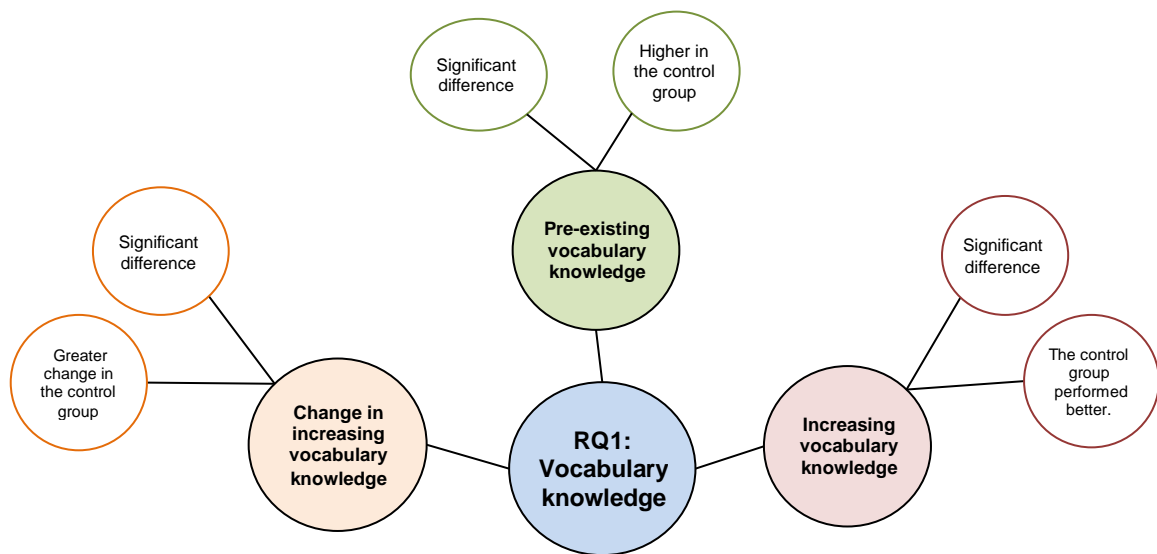


Figure 5.2 Key results in research question 1 (RQ1)

The key results in Figure 5.2 are presented in three aspects: pre-existing vocabulary knowledge, increasing vocabulary knowledge, and change in vocabulary knowledge. The results show a significant difference in all aspects, though not as expected, and the heterogeneity in students' pre-existing vocabulary knowledge occurred at the beginning of the course. As mentioned in the literature review, most prior related studies revealed positive results in learners' vocabulary development, that is, their vocabulary knowledge increased with an impact of a blended learning approach--the intervention group outperformed their counterpart in vocabulary development (Banditvilai, 2016; Djiwandono, 2013, 2018; Ja'ashan, 2015; Jia, Chen, Ding, & Ruan, 2012; Jung & Lee, 2013; Karaaslan et al., 2018; Khalili et al., 2015; Khodaparast & Ghafournia, 2015; Maria & Othman, 2015; Mashhadi et al., 2016; Nanclares & Rodríguez, 2016; Pertiwi, 2018; Suwantarathip & Orawiwatnakul, 2015; Tehrani & Tabatabaei, 2012;

Vasbieva, Klimova, Agibalova, Karzhanova, & Birova, 2016). In contrast to the earlier research, the current study found that, according to the results derived from the participants' post-test, the level of increasing vocabulary knowledge in the control group was significantly different and higher than the experimental group. Additionally, based on the greater change in the control group's vocabulary learning, it probably indicated that the treatment in the blended learning environment was not likely to have had a positive effect on the experimental group. Likewise, this finding is contrary to prior studies in the flipped classroom which have revealed the positive effect on learners' vocabulary achievement in the experimental group, that is, the instructional model is likely to assist them in vocabulary learning (Alnuhayt, 2018; Chen, 2018; Sun, 2016; Zhang et al., 2016).

The results from the current research appear to share similarities with Alshwiah (2010) and Tosun (2015), in terms of the blended learning approach that does not play an effective role in improving the learners' vocabulary learning. That is, Alshwiah (2010) revealed that the control group may perform slightly better than the experimental group, but their scores did not have a significant difference. In terms of the research design, this current study is similar to the other research (Tosun, 2015), conducted with the quasi-experiment; however, the results were slightly different. In that research, the participants had homogeneous pre-existing vocabulary knowledge, and, comparing to the control group, the experimental group gained non-significant change in vocabulary knowledge. In terms of the negative results, this current study is more in line with a study on blended learning instruction in an English grammar course (Arfaorafiee & Ameri-Golestan, 2015). The findings revealed a significant difference between the two groups, and the control group outperformed their counterpart in vocabulary achievement. This also accords with another study in an English reading course, taught with the flipped classroom (Gross, 2014), which showed that the control group performed the reading skill better than the intervention group, due to students' dissatisfaction with the selected online tools and the method might not be suitable with every type of language lesson.

Although students in the experimental group used English to practice during class time, a possible explanation for these results may be relying predominantly on the coursebook, which may lead to lack of balance between deliberate and contextualised learning, and this may not enhance their vocabulary learning sufficiently (Nation, 2003). This is because the textbook may focus on word forms and meaning (Brown, 2010), and students might be exposed to deliberate vocabulary teaching more frequently than the incidental learning which enhances them to learn words through contexts (Oxford, 1990). Hulstijn (2001) and Nematı (2009) suggested that the language learners should be exposed to deliberate or de-contextualised instruction, and later gradually provide them with context-based vocabulary from listening to stories, authentic conversations, or extensive reading. During the English course, the participants might not be provided sufficient after-class practice in regard to such suggestions. Hence, it is important for teacher to strike a balance between the two vocabulary instructional methods to lead to the utmost use of them during the course (Nation, 2003). Another possible alternative explanation of the results is that learning with the use of technology incorporated into the instruction may not be as effective as expected. Although, students perceived blended learning instruction in a positive way, they might not find the learning tools beneficial or effective to promote their learning adequately (Tosun, 2015). Furthermore, in the flipped learning model, students are anticipated to establish satisfying learning outcomes by spending their out-of-class time undertaking online self-study or assignment (Hsieh et al., 2017); however, there might be an external variable related students' study skills. That is, it is likely to be uncontrollable how efficiently they utilised time and technological devices to contribute to their out-of-class content and practice. This is because using computers or technology may cause them distractions and multi-tasking which can affect their time management and concentration on learning (Fried, 2007; Wood et al., 2012), including their cognitive load (Kalyuga, 2013). Additionally, while studying they might encounter difficulties, technical problems, or demand for explanations and support, which probably affected their learning (Engin, 2014b; Herreid & Schiller,

2013; Hsieh et al., 2017; Ping et al., 2019), including task and technical complexities which may occur during the online study (Pino, 2008).

To conclude, contrasting with most previous work which revealed positive effects of blended learning, this current study found negative results with a significant difference between the experimental and control groups, where the control group outperformed their counterpart in increasing vocabulary knowledge. As can be seen, blended learning instruction might not be effective for the learners in the experimental group, and the traditional method seemingly affected the control group more in a positive way. It is possible that the negative results were influenced by some factors affecting students' vocabulary learning during the course, such as lack of balance in particular types of vocabulary learning due to relying mainly on the coursebook content, an individual learner's time spent on online activities outside the classroom, including their preferences for the use of technology incorporated into this course. Therefore, although vocabulary learning plays an important role in the language acquisition for EFL learners and blended learning is claimed to enhance their vocabulary knowledge (McCarthy, 2016), these findings may suggest that there are things to take into account in vocabulary learning, such as providing more authentic assessment related to real contexts, adjusting amount of learning content or objectives to be appropriate within limited class time, and supporting students with more facilitation and guidance for their self-study. These also corroborate with the idea of the blended learning components which consist of input, content delivery, interaction and feedback, that is, teaching vocabulary should consider the type of language input and appropriately selected tools or teaching aids for content delivery or presentation (Banados, 2006). Moreover, another key of creating a deeper and meaningful blended learning environment is to engage learners in the use of technology, interaction and collaboration through activities, and corrective feedback, which will bring them opportunities to involve in a process of learning and improvement (Chapelle, 2003; Ellis, 1999, 2008; Ferreira, 2003). Blended learning, therefore, relates the instructional process to learners' collaboration and knowledge construction, which can benefits knowledge

acquisition and understanding and lead to a successful educational experience (Garrison & Archer, 2000). As the aspect of students' increasing vocabulary knowledge discussed, the extent of vocabulary knowledge retention will be presented in the next research question.

Research question 2

RQ2: To what extent do students retain their vocabulary knowledge?

With respect to the second research question, it aimed to investigate the extent of students' vocabulary knowledge retention between the experimental and control groups, in three aspects: vocabulary knowledge retention one month after the course ended, change in knowledge retention during the course (from the beginning to one month after the course ended), and change in knowledge retention one month after the course ended. As shown in Figure 5.3, the key results are summarised in those three aspects.

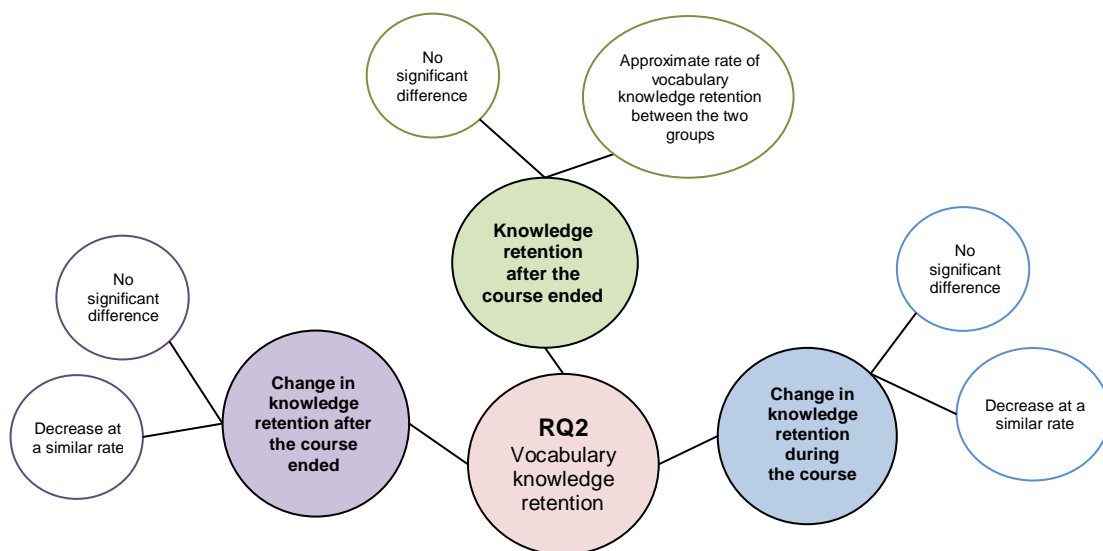


Figure 5.3 Key results based on research question 2 (RQ2)

From Figure 5.3, the results show no significant difference in all aspects, that is, the two groups tended not to retain vocabulary knowledge at a similar level. Additionally, the change in their knowledge retention, during the course and one month after the course ended, tended to decrease over this time. Considering the effect size, it also indicates more impact of instruction on the control group in word retention. This outcome is contrary to that of Have (2012) who found that students that were exposed to digital

media had a high level of knowledge retention. Furthermore, these results are contrary to the positive vocabulary learning outcomes, derived from a study on the flipped classroom (Zhang et al., 2016) which indicates a supportive role to develop learners' vocabulary and word retention. Although the study variable in the current research probably differs from another study conducted by Arfaorafiee and Ameri-Golestan (2015), investigating the impact of blended learning towards English grammar learning and knowledge retention in EFL classrooms where the control group outperformed the experimental group in both learning outcomes and recall of the taught content, they are likely to be consistent in a way that the treatment of the blended learning method might not play an effective role in helping to retain the participants' vocabulary knowledge.

These results may be explained by the fact that despite incorporating with a mind-mapping activity, suggested as one of the useful learning strategies which is positive to assist learners for deep understanding (Marton & Booth, 1997; McCombs & Miller, 2007), or word-associating tasks into in-class practice and assignments, lack of sufficient rehearsal after class might cause a decreasing rate of knowledge retention. As mentioned in the literature review, rehearsal or continuous practice is likely to remain what is learnt or taught active to be recalled and transferred to the long-term memory (Anderson, 1995; FriedenberG & Silverman, 2016; Hintzman, 1978; Skehan, 1998). However, during the course, rote memorisation was seemingly engaged in part of the instruction, which might cause lack of meaningful or deep learning (Lujan & Dicarlo, 2006). Relating such rehearsal to rote memorisation in order to cope with the exams may not improve the retention effectively in the long run (Woodward et al., 1973). Moreover, with pressure to pass tests, rehearsal for rote memorisation may help them to do the tests, but may not play a role to retain the vocabulary (Wolfe, 2010). Consistent with these claims, some studies revealed that word rehearsal at particular intervals probably played a slight impact on recalling (Glenberg et al., 1977) as it might be because of time limits of the rehearsal (Finnesgard et al., 2014). Therefore, due to time constraints with

rehearsal or practice and rote memorisation, the participants' recall of taught vocabulary may not be as significant as expected.

A possible explanation for the weak impact of the blended learning approach on their lower rate of recall might stem from surface learning that occurred during the instructional process, in which they may emphasise memorising words learnt instead of assimilating the meaning of them (Casea & Marshall, 2004). Moreover, although the participants were provided with online platforms, such as discussion forums, peer evaluation or feedback, or self-assessment, including teaching approaches which get them involved in collaborative and communication tasks, which were supposed to encourage deep learning or understanding and lead them to positive retention of knowledge (Garrison & Vaughan, 2008; Ramsden, 2003), there are difficulties for them in becoming a deep learner who is supposed to get engaged in what is learnt and in the learning environment (Draper & Waldman, 2013; Haggis, 2003). This seems to agree with Nemati (2009) who found that despite utilising teaching aids or efforts in vocabulary learning, it could not be productive or it causes learners to struggle to recall the vocabulary knowledge. It is also likely that deep and positive learning can be influenced by some cognitive factors, such as motivation, learner intentions, assessment, and teaching, (Alvira, 2016). Therefore, it is possible that they lack the intrinsic motivation which encourages deep learners to be interested and attentive to master a subject or content (Marton & Saljo, 1997). Instead, they emphasise more remembering text or tasks, probably, to pass the test or achieve good grades, which rather seems to be surface learning. However, it is important to bear in mind that this explanation might not be applied with all participants because students' motivation is seemingly to differ individually due to their particular characteristics (Ryan & Deci, 2000), and they can affect students' degree of learning diversely. It is also noted that variation in motivation, academic preferences, characteristics of learners and learning capabilities seems to be cognitive and motivational factors towards deep or surface learning, which may cause differences in learners' knowledge construction (Hu et al., 2011; Loob, 2001).

Although the blended learning instruction in this study was prepared under the cognitive approach which could lead to deep learning, the surface learning approach is inevitable and occurs very often as it tends to be deployed by many students. They might use it to reproduce authentic learning or what they have learned, or to memorise the content for the exams. However, to assist them to retain vocabulary better, teaching for understanding and retention connects what is learned with previous experience or knowledge and may enable students to gain concepts and engage in active learning which makes learning meaningful (Cortright et al., 2003; Halpern & Hakel, 2003; McTighe & Seig, 2014; Zirbel, 2006). In other words, it might be advantageous to concern the situatedness of learning which connects the whole environment (time and place/situation) to what is learned (Reffat & Gero, 1999) and to expose students to the learning setting which is able to relate them to the *real contexts* that they can assimilate the meaning of what they learn, not the quantity they can remember. Therefore, there are more of important factors, which are necessary to be considered, such as curriculum design, learning objectives and outcomes related to expected levels of understanding that learners are required to reach, design in teaching methods or active and meaningful learning activities for understanding, as well as actual practice leading to retention and transfer (Biggs & Tang, 2011; Entwistle, 2000; Fenwick et al., 2014). Additionally, with sufficient time provided to engage in the learning activities, it is likely for learners to understand and increase their retention interval longer (Cortright et al., 2003; Lujan & Dicarolo, 2006).

Another possible explanation for these findings is that, as students have several courses to take during the term time, they have to deal with workloads and content in other courses. Consequently, as time passes, memories tend to be decreasing due to the intervention of new information or other subsequent content interference (Anderson, 1995; Bacon & Stewart, 2006), then forgetting is likely to occur (Ausubel, 2000) during the time of acquiring knowledge and skills, which causes the retention rate to decrease (Lindsey et al., 2014). The decrease in knowledge retention is also supported by evidence from the low reliability of the participants' responses

along the delayed test (Appendix 17), which reveals that guessing probably occurred and affected their test scores due to forgetfulness or inattentiveness to the test. This also accords with earlier work which indicated that students in higher education tended to forget what was previously taught (Miller, 1962; Richardson, 1993; Swanson et al., 1996). One main reason that causes forgetting is lack of regular use of what is taught or learnt (Ritter et al., 2013), which is congruent with what Arthur et al. (1998) stated, that is, procedural knowledge gained through training or skill practice may be lost due to lack of use for a long period. In other words, the participants gained declarative vocabulary knowledge – meanings and part of speech, but without sufficient use and applying, the knowledge may not reach the level of procedural knowledge which plays an important role in recall or retrieval (Lojova, 2009). Moreover, coping with loads of tasks during their study may discourage them to store and retrieve the information they learnt (Yilmaz, 2010). Some other possible factors that affect the participants' knowledge retention are concentration, attention or interests, motivation, and content relevance to their background knowledge. Consistent with the interview in this current study, students revealed a difficulty in word recall due to lack of their regular use of taught vocabulary. Furthermore, from their viewpoint, the content seems to be irrelevant to their major. That is, the content is related to business and organisation, while their major rather pertains to scientific subjects; consequently, it is likely that they are unable to recall the word they learnt. In this current study, the participants took an end-of-unit quiz at the end of each lesson in order to wrap up the taught content, including vocabulary. Accordingly, McTighe and Seig (2014) recommended teachers employ quizzes or tests that provide an opportunity for students to gain immediate feedback in order for them to know what they have learned or how deeply they have understood. However, the findings from a study by Wheeler et al. (2010) have suggested that repeated instructions with no tests brought more positive rate of recall, but repeated tests were found to be more positive towards recalling when they tend to study over a longer period of time. Therefore, training courses or repeated instructions are probably recommended during their study year or before their graduation.

In language learning, memory is an essential part of the perception of information or what is learnt (Dubuc, 2002a). Attention or concentration is also an important factor when learners perceive the information before it is stored into short-term memory (Anderson, 1995). However, the short-term memory has a limited duration for the perceived information because as time passes it can deteriorate (Peterson & Peterson, 1959). Hence, the information needs to be stored or remembered for a repeated period of time to build neural connections (Tri, 2016), before it is transferred to the long-term memory where what is learnt is associated with existing knowledge, organised and recorded permanently (Anderson, 1995; Skehan, 1998). In other words, in vocabulary learning, before the meaning of words learnt is encoded, elaborated, organised and structured into the long-term memory, it requires a period of time for rehearsal and repeating to avoid loss of the information (Friedenberg & Silverman, 2016; Halpern & Hakel, 2003). Hence, not only does technique of word associative rehearsal work well to improve the retention of information in the long-term section (Woodward et al., 1973) but also well-structured and meaningful representations of vocabulary knowledge in conjunction with the process of overlearning and recalling might be effective for students to recall and retrieve the words and meanings they learnt previously (Karpicke & Blunt, 2011; Karpicke & Roediger, 2008). Therefore, it is vital to deliberately provide learners, such as giving explanatory or unified presentation, presenting methods, testing, program design, and logically meaningful materials, as these methods can influence their cognitive structure which will benefit the knowledge retention (Ausubel, 2000). Although rehearsal has probably been claimed to have a slight effect on students' knowledge retention due to its amount and time limits (Finnesgard et al., 2014; Glenberg et al., 1977), to obtain a satisfying effect of rehearsal on recall, the amount of well-designed rehearsal within the appropriate time intervals should be taken into account. Furthermore, to increase students' learning capabilities, factors within a positive learning context are necessary to be created, such as an appropriate room environment, motivation, a suitable instructional practice, properly-selected technology, and thinking strategies.

Having discussed the impact of the blended learning environment on students' vocabulary knowledge retention, the results will be discussed from another aspect regarding gender differences in the next research question.

Research question 3

RQ3: Are male students' test scores different from female students'?

The third question in this research was to examine the extent of gender differences within each study group (experimental group and control group), derived from male and female students' test scores (PET, pre-test, post-test and delayed test).



Figure 5.4 Key results based on research question 3 (RQ3)

Figure 5.4 summarises the key results into seven aspects: English language proficiency, language proficiency, pre-existing vocabulary knowledge,

increasing vocabulary knowledge, change in vocabulary knowledge, vocabulary knowledge retention, change in their vocabulary knowledge retention during the course (from the beginning to one month after the course ended), and change in their knowledge retention one month after the course ended. As can be seen from Figure 5.4, regarding each study group, firstly, within the experimental group, gender differences were found in language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge, vocabulary knowledge retention and change in the knowledge retention during the course, and these revealed a higher level in females than males, while their change is not different in vocabulary knowledge and knowledge retention one month after the course ended. Meanwhile, within the control group, a gender difference was found particularly in the pre-existing vocabulary knowledge, in which females outperformed their counterpart, while both genders shared a similar level in other tests and gain scores (PET, post-test, delayed test, change in scores of pre-post, change in scores of pre-delayed, and change in scores of post-delayed).

Regarding the results from the control group, although a significant difference particularly occurred in the pre-test scores, mean scores in other tests and gain scores still showed that females performed better than males. Consistent with the literature, these results, especially from the experimental group, agree with the idea of gender that is probably a significant dimension in language learning (Mitchell et al., 2013), and a gender difference exists in the learning contexts, that is, females tend to perform better than males in language learning (Božinovic & Sindik, 2011; Oxford, 1993; Zoghi et al., 2013). Although, these results differ from some previous studies (Grace, 2000; Phonhan, 2016; Viriya & Sapsirin, 2014) which found no significant gender difference in language learning in the EFL contexts, they are in accordance with those of Gu (2002), Ok (2003), Okaz (2015), Salahshour et al. (2012), and Yilmaz (2010), who have demonstrated that female students are likely to be better language learners than males because females tend to have higher language proficiency and apply greater use of vocabulary and language learning strategies. In addition, as female students' test

scores in this study indicated they tended to retain better vocabulary knowledge than males. Other previous work confirms that females are likely to have distinct mechanism of short-term and long-term memory system which is likely to benefit their vocabulary learning, including their word memory retention and retrieval (Kaushanskaya et al., 2011; Lin, 2011).

Another possible explanation is that better language learning performance in females might be caused by differences in terms of attitudes and motivation. In accordance with some prior research, females students show a higher level of positive attitudes and motivation in language learning and their study (Dhakal, 2018; Kobayashi, 2002; Yilmaz, 2010), including higher satisfaction towards technology-mediated elements used in a blended learning course (Al-Fadhli, 2008; Dang et al., 2016). Furthermore, females are likely to have more face-to-face interaction (Naaj et al., 2012), participate more in social and academic activities outside the classroom (Yoon & Lee, 2010), and realise the greater importance of classroom or community interaction than males (Graff, 2003). Related to other previous work, these gender differences may have been influenced by length of language study (Slik et al., 2015), levels of text or content difficulty (Lin, 2011), levels of learners' language proficiency (Grace, 2000), gender characteristics (Phonhan, 2016), including particular cultural background and individual characteristics (Viriya & Sapsirin, 2014). In this study, the influences that have impact on gender differences seem to be consistent with some of the factors above, that is, female students' higher language performance could be attributed to their biological difference in cognitive and affective systems, a pre-existing level of language proficiency, academic background, and females' learning capabilities and characteristics that differ from males. Therefore, with a certain component of individual and group work in the blended learning environment, it is possible that female learners tend to perform better than males, especially in language courses, which probably corresponds with the idea of gender differences mentioned above. In addition, these results may suggest the notion that gender may reflect differences in academic performance, learners' characteristics, and motivation in language learning. It is therefore

likely that factors related to gender differences should be taken into consideration in designing language or blended learning courses (Okaz, 2015). Apart from examining the gender difference, the results will be discussed in the aspect of the participants' academic majors in the next section.

Research question 4

RQ4: Are engineering major students' test scores different from architecture major students'?

The fourth research question was set up to investigate the extent of differences in academic majors, between engineering and architecture students who were taught in the blended learning environment. Figure 5.5 shows the key results in four aspects: English language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge and change in vocabulary knowledge.

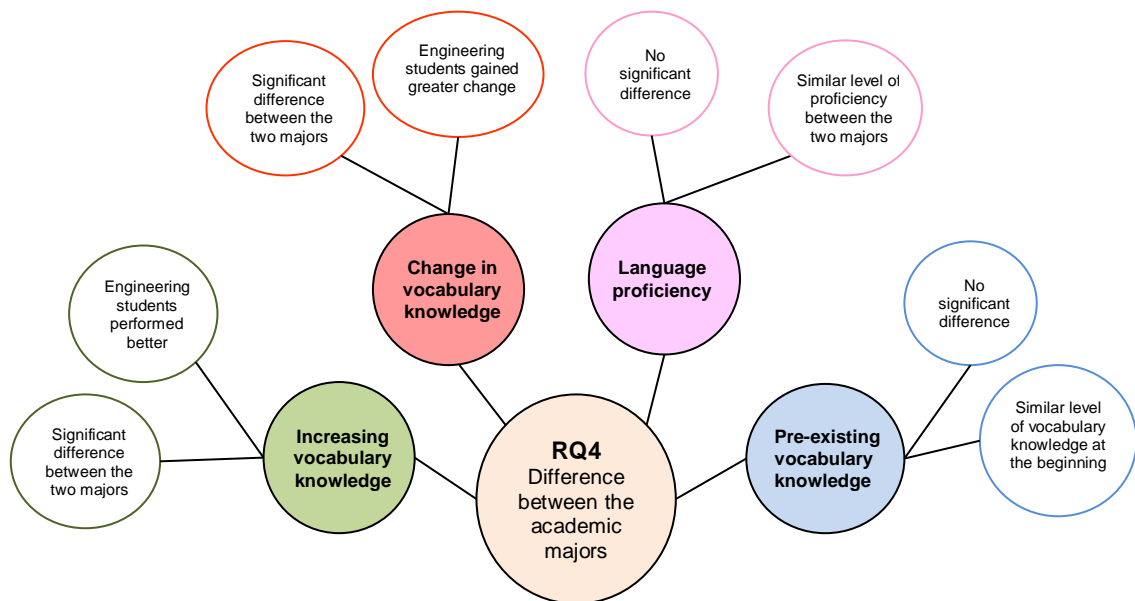


Figure 5.5 Key results based on research question 4 (RQ4)

Figure 5.5 shows that, at the beginning of the course, participants from the two majors shared the homogeneity in their language proficiency and pre-existing vocabulary knowledge. However, after the intervention, the engineering students had a higher level and gained greater change in vocabulary knowledge than the architecture major. In this study, engineering students' characteristics seem to be consistent with those from previous

studies (Driscoll & Garcia, 2000; Gu, 2002; Ictenbas & Eryilmaz, 2011; Phonhan, 2016; Tulsi et al., 2016), which showed that they tend to be active with group work and participate enthusiastically in assigned tasks, and apply greater learning strategies to benefit their vocabulary development. However, architecture students' characteristics at the fieldwork site was found to be slightly different from what Brow et al. (1994), Demirbas and Demirkan (2003), Demirbas and Demirkan (2007), Demirkan and Demirbas (2010), and Mostafa and Mostafa (2010) stated. That is, according to the authors, they tend to naturally learn subject matter through explanations, ideas, and concepts, engage their thinking and feelings into their learning, and be active and positive in group work. Although many of the participants from the architecture major in this study may share slightly similar characteristics as mentioned, on average, they seem to have a low rate of class attendance and in-class participation, as information shown in the results chapter (RQ7: 2.4, Table 4.3). Moreover, in terms differences in characteristics between the two academic majors, the participation records showed that the architecture students have the lowest average scores of undertaking assignments in before-class sessions, which reflects their insufficient responsibility and willingness to participate in the assignments or tasks. Meanwhile, the engineering students gained greater average participation scores in undertaking the before-class self-study, attended class regularly, and participated more actively in class. Regarding their academic outcomes, not only did the engineering students gain greater change in vocabulary knowledge, but also their learning achievement from the English course was higher. This is also supported by the evidence of average percentage of their learning achievement shown in the results chapter (RQ7: 2.4, Table 4.2). That is, the engineering major students performed much better than the other major in end-of-unit quizzes, midterm and final exams. The possible interference of instruction might not be the only main impact on their learning outcomes, but also other factors. Comparing between the two majors through the in-class observation, the engineering students seemed to be more attentive and interested in assigned tasks and activities, and attempted to employ strategies in vocabulary learning. Consistent with the previous work (Gu, 2002; Phonhan,

2016), those from science and mathematics majors may have greater existing vocabulary size and use different learning strategies than arts and social studies students, which benefit their language learning. It is therefore likely that such distinction exists in the two academic majors, which may cause learning capabilities and characteristics to be different.

Another possible explanation for these results might be intrinsic motivation which is an important factor for learners to be concerned about mastering a subject or content (Marton & Saljo, 1997), The degree of their motivation can influence students' learning differently because it seems to differ based on their individual characteristics (Ryan & Deci, 2000). In other words, learners' characteristics from the different majors are considered important as they can lead to different levels of motivation and academic preferences, which may cause variation in their cognitive learning and knowledge construction (Hu et al., 2011; Loob, 2001). Moreover, students' different characteristics may cause them to have dissimilar learning capabilities and strategies which may affect their language learning outcomes (Phonhan, 2016; Yilmaz, 2017). These explanations reflect the results in Tosun (2015) and Banditvilai (2016) who also found that during the blended learning lessons, negative perceptions may occur, such as students' dissatisfaction towards the selected online tools provided by the teacher and lack of motivation in online vocabulary learning and out-of-class assignments. Consequently, these can cause the low rate of participation as mirrored in the previous studies by Alshwiah (2010) and Karaaslan et al. (2018), who found that the low rate of participation in online assignments may stem from lack of motivation. This result may have influenced by students' limited background knowledge, uninteresting or difficult activities, difficulties in being an independent learner or lack of autonomous learning skills, and heavy study or workloads in other courses. Additional assignments in other courses during the term time are also another possible extraneous variable that might have the impact on students' (language) learning achievement, that is, the study workloads can cause lack of sufficient time spent for the language course or in class (Saengsawang, 2013). As a consequence, it can be relevant to the lack of motivation to learn as discussed above. They

may find the online assignment burdensome and cause them to spend more time apart from the other courses. As can be seen, differences between the different academic majors exist and can cause variation in their learning outcomes and academic achievement. Therefore, this aspect should be concerned when designing blended learning lessons in a language course because the tasks and assignments provided to different students' majors may cause language learning outcomes to be varied. As discussed in the aspect of differences in academic majors, the next research question will look into differences between the registered classes.

Research question 5

RQ5: To what extent do students' test scores differ between the different registered classes?



Figure 5.6 Key results based on research question 5 (RQ5)

With respect to the fifth research question, it sought to examine differences between the different registered classes in their increasing vocabulary

knowledge and vocabulary knowledge retention. Figure 5.6 presents the key results into seven aspects: language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge, change in vocabulary knowledge, vocabulary knowledge retention, change in knowledge retention during the course (from the beginning to one month after the course ended), and change in the knowledge retention one month after the course ended. As shown in Figure 5.6, differences occurred between the registered classes. Class 2 gained the highest level in language proficiency, pre-existing knowledge, increasing vocabulary knowledge, and change in vocabulary knowledge retention one month after the course ended. Class 3 had the highest level in change in vocabulary knowledge, vocabulary knowledge retention, and change in knowledge retention during the course. Moreover, within the experimental group (classes 1, 3 and 5), class 3 gained the most significant vocabulary knowledge and positive change in all aspects. Supported by the evidence in Table 4.2 (RQ7: 2.4), in the results chapter, class 3 (logistics engineering students) gained the highest score percentage in end-of-unit quizzes, midterm and final exams, while class 5 (architecture students) gained the lowest scores in these evaluation criteria. Although class 1 (industrial electrical engineering students) had the lowest pre-existing vocabulary knowledge at the beginning of the course, they later gained slightly higher scores than class 5. This is also confirmed by the evidence of their participation in before-class and in-class sessions, and class attendance. That is, based on the evaluation criteria, class 3 obtained the highest and class 1's scores are at approximately the same level as class 3, while class 5 gained the lowest in those criteria. The low percentage of learning outcomes shown in class 5 may be congruent with what Tosun (2015) and Banditvilai (2016) found from their participants' perceptions and attitudes towards the blended learning environment. That is to say, some of the students' dissatisfaction may occur because of the technology-mediated tools used by the teacher, including their lack of motivation in online vocabulary learning and out-of-class assignments, which is also in accord with Alshwiah (2010) and Karaaslan et al. (2018), who indicated that the low rate of participation in online assignments probably stemmed from lack of motivation. They also added other reasons that might affect their learning

achievement and low participation, such as, limited background knowledge to the current course content, uninteresting or difficult activities for them, heavy study or workloads in other courses during the term time, and difficulties to be an independent learner or lack of autonomous learning.

Regarding the traditional class, class 2 (logistics engineering major) seemed to have low before-class participation scores because the exercises in the course book might not be presented in a certain platform as the experimental group received. Consequently, many of the students probably ignored or failed to remember to complete the assignments. However, their class attendance and in-class participation scores are at approximately the same level as class 3. Despite the large class size, in the traditional classroom, which was not often convenient for teacher's monitoring, they seemed to participate well in group work or assigned tasks. Their characteristics and learning capabilities tend to consistent with Afshar et al. (2014) and Tulsi et al. (2016), that engineering students are likely to be active and enthusiastic to participate in tasks and activities, including employing more strategies in their learning.

In regard to language proficiency and pre-existing vocabulary knowledge scores from all classes, part of the result shows that classes 2 and 3 gained higher scores at the beginning. This is in agreement with Liu (2007) and Maleki and Zangani (2007), who indicated that the level of English language proficiency positively correlates with motivation and attitude in language learning, and this is likely to have a better impact on academic achievement. As a consequence, students from these classes may have greater motivation and positive attitudes towards their study and tended to use more certain strategies to achieve their language learning (Gu, 2002; Salahshour et al., 2012; Yilmaz, 2010), as the outcomes shown in their greater change of vocabulary knowledge and knowledge retention. However, this does not appear to be the case with classes 1 and 5. That is to say, although class 1 had the lowest scores in language proficiency and pre-existing vocabulary knowledge, the students in class 1 seemed to gain considerably greater change in vocabulary knowledge than those in class 5. This is also supported by the average score percentage of their participation and exams

as mentioned earlier. The evidence might imply the possible reason for different learners' characteristics between the engineering and architecture students, which reflects on their responsibility and independent learning for out-of-class activities. Other possible explanations for this might be extraneous variables, such as time spent on their study through the use of technology, additional workloads in other courses during the term time, and their self-discipline and awareness in language learning. These findings, therefore, might further indicate that the blended learning approach is likely to be effective with some particular groups of students with motivation to learn, readiness for a certain level of independent and active learning, including self-discipline and responsibility towards their study. In terms of instructors, it is important to consider the nature or characteristics of each particular group of learners in order to select appropriate use of teaching methods, tools, and assessment. In the next research question, we will look into the relationships between students' language proficiency, vocabulary knowledge and knowledge retention.

Research question 6

RQ6: To what extent are there correlations between students' English language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge and vocabulary knowledge retention?

The sixth question in this research was to investigate the relationship between the participants' language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge, and vocabulary knowledge retention. Figure 5.7 summarises key results, derived from the test scores, in six aspects of the relationship. In terms of the positive high relationship, it shows that pre-existing vocabulary knowledge at the beginning of the course tended to be influenced by the level of language proficiency. Furthermore, vocabulary knowledge retention is affected by the level of language proficiency, pre-existing vocabulary knowledge and increasing vocabulary knowledge. However, the levels of language proficiency and pre-existing vocabulary knowledge play a small part on increasing vocabulary knowledge.



Figure 5.7 Key results based on research question 6 (RQ6)

As can be seen, language proficiency and vocabulary knowledge that students have at the beginning of the course do not have a high correlation with the increasing vocabulary knowledge. These results may corroborate the ideas of Meara (1996), who suggested the multi-state model (from 0 to 5) of vocabulary learning, in which learners' movement of vocabulary knowledge acquisition can move from one stage to any other regardless of sequence. That is, during their vocabulary learning, they might acquire a word and use it correctly, or they know the word and can tell its meaning, but later they might forget the word they learnt, due to the changeable learning conditions and environment towards learners' knowledge acquisition and memory. In other words, the level of language proficiency and pre-existing vocabulary knowledge might not confirm an increase in

word knowledge. As discussed earlier, there might be other extraneous variables affecting the increase in their vocabulary knowledge, such as teaching methods, learners' motivation, characteristics and differences in gender and academic majors. In a particular group of learners, it seems possible that treatment or teaching methods might not have a considerable impact on their learning outcomes. This is supported by the evidence of students from class 5 (architecture students) who gained approximately the same level of language proficiency and pre-existing vocabulary knowledge as those from classes 2 and 3; however, class 5 finally obtained the lowest change in the increase of vocabulary knowledge. Therefore, this rather contradictory result may be due to their motivation, and characteristics, that reflect awareness and responsibility towards their study.

As the findings show that language proficiency has a high correlation with the learners' pre-existing knowledge at the beginning of the course, it may reflect the tendency of language abilities which influences students' vocabulary knowledge. It is probably consistent with Yilmaz (2010) and Salahshour et al. (2012), indicating that a certain level of language proficiency is likely to be relevant to learners' use of language learning strategies which affects their language learning achievement. This is also supported by the high correlations of the language proficiency, pre-existing knowledge and increasing vocabulary knowledge, with knowledge retention. It indicates that language abilities and a certain level of vocabulary knowledge may play the main part in retaining vocabulary knowledge at a certain rate, which can relate to part of their learning achievement and awareness in language learning. The part of the result corroborates the findings of Liu (2007) and Maleki and Zangani (2007), who found that English language proficiency is correlated with learners' motivation and attitude in language learning, and academic success. This may imply that, comparing to learners at low levels, those with high language abilities may employ more frequent use of language learning strategies, which will enhance their language learning achievement (Gu, 2002). Hence, in the blended learning environment, these relationships may help us to consider learners' level of English language proficiency, prior knowledge, skills and

background before the course starts in order to perceive their abilities and be able to create lessons to suit them as well as possible.

In the next section, through the students' perceptions and attitudes, and teacher and researcher observation, the feasibility of using the blended learning approach will be discussed in research question 7 (RQ7).

Research question 7

RQ 7: To what extent is the use of a blended learning approach feasible?

With respect to the last research question, it sought to determine the feasibility of the blended learning instruction in EFL classroom. Figure 5.8 shows the key results derived from the four research tools: researcher observation, independent teacher observation, questionnaire and interview.

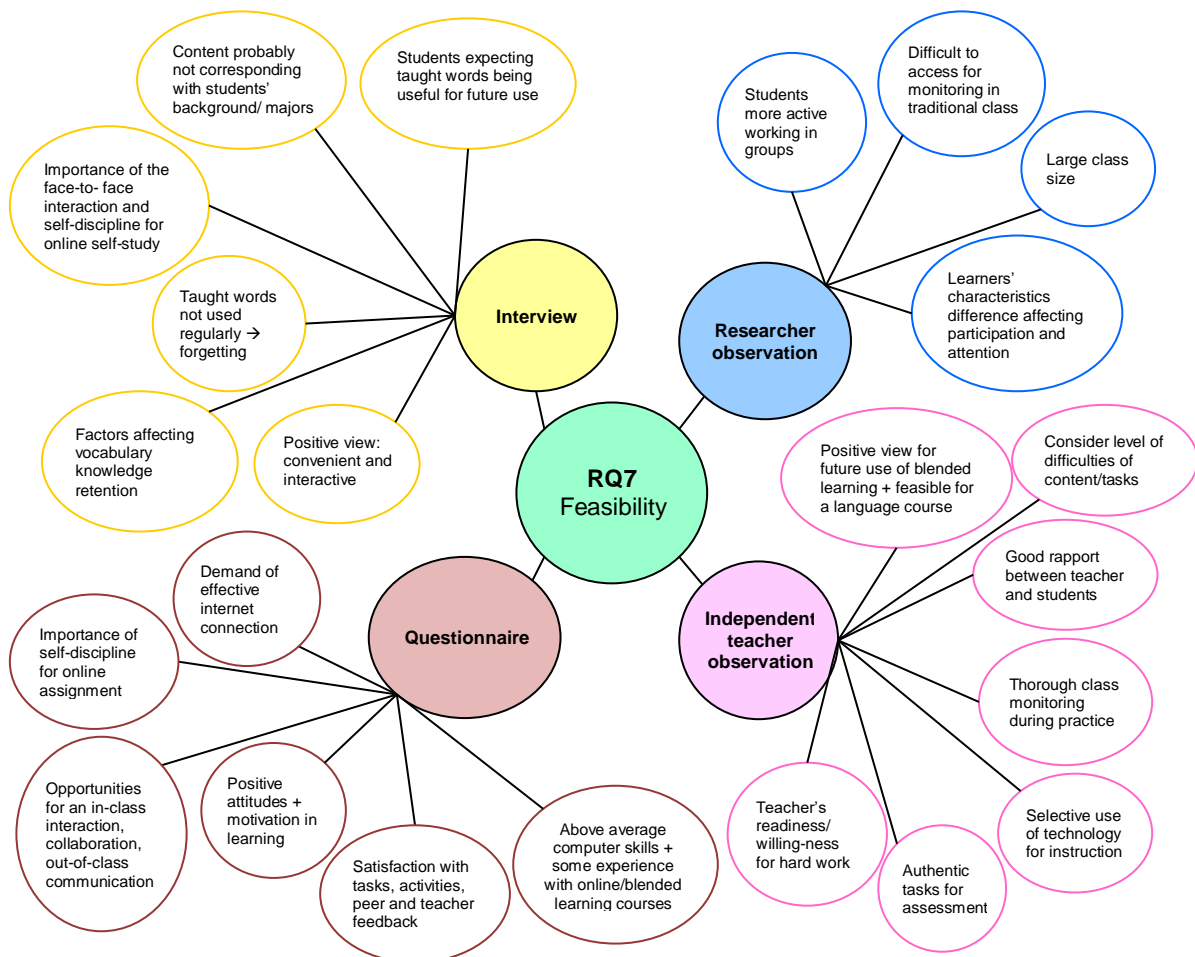


Figure 5.8 Key results based on research question 7 (RQ7)

The key findings in Figure 5.8 indicated that, as observed in experimental and traditional classes, monitoring tended to be difficult to do thoroughly in

large classes. Additionally, only random checks on students' practice could occur during activities due to time constraints. It was also found that the learners' different characteristics played a part in class attention and participation. Based on the independent teachers' perspectives, the flipped classroom is feasible and beneficial for a skill subject as English which needs to enhance learning through practice. There are important things in regard to blended learning instruction, such as good rapport between students and teacher, thorough class monitoring, good use of technology, assessment with authentic tasks, and teacher's willingness for hard work in preparations for course materials. The participants from the experimental group generally have above average computer knowledge and have gained part of experience in online or blended learning courses. Through the participants' views, on the one hand, overall perceptions and attitudes are positive towards the instruction, in terms of convenience, in-class/out-of-class interaction, collaboration, and peer and teacher feedback. On the other hand, they view that, first, the coursebook content may not correspond to their background or major. Second, to undertake online self-study, self-discipline is very important for completing the assignment. Finally, lack of opportunities to use taught words regularly possibly affects their vocabulary knowledge retention, and they expect to have a chance to use those words for future work.

There are similarities between the attitudes expressed by the respondents in this study and those described in the previous related work on blended learning (Banditvilai, 2016; Djiwandono, 2013; Jung & Lee, 2013; Karaaslan et al., 2018; Khalili et al., 2015; Maria & Othman, 2015; Mashhadi et al., 2016; Pertiwi, 2018; Suwantarathip & Orawiwatnakul, 2015; Tehrani & Tabatabaei, 2012). That is, the participants were satisfied with the blended learning environment which incorporates technology mediation and face-to-face interaction into the course. In accordance with several prior studies (Banditvilai, 2016; Djiwandono, 2013; Karaaslan et al., 2018; Khalili et al., 2015; Maria & Othman, 2015; Mashhadi et al., 2016; Pertiwi, 2018; Tehrani & Tabatabaei, 2012), they expressed their positive views towards the use of online platforms or tools, tasks or activities and interactive feedback through

blended learning instruction. A possible explanation for their positive perceptions and attitudes towards the course may be attributed to the fact that with their above average computer skills and technical literacy, it may be in line with a study by Tehrani and Tabatabaei (2012), in which the participants revealed positive opinions in their computer use and knowledge. Gülbahar and Madran (2009) additionally found that students' perceptions and satisfaction correlated with their computer and internet background knowledge. This is probably because, with the technology and online platform integrated within the instruction, it may lead to opportunities for them to be exposed to a challenging atmosphere and a more meaningful lesson. The positive views of a blended learning approach which is of assistance to their vocabulary learning also aligns with Jung and Lee (2013), Suwantarathip and Orawiwatnakul (2015) and Tosun (2015), which showed the participants' enjoyment in vocabulary learning, significant vocabulary improvement, and positive experiences through the use of technology-mediated tools during the course. Based on the independent teacher observations, the participants in this study actively participated more in game activities, which is consistent with what was found in the previous studies by Karaaslan et al. (2018) and Maria and Othman (2015), that is, students enjoyed the use of games integrated in the instruction and they are meaningful and effective for their learning.

Apart from the instructors' additional work in preparing online lectures or lessons and in-class activities, students are required to take initiative and responsibility in their out-of-class self-study (Danker, 2015), which was also anticipated to encourage their autonomous skill (Wang et al., 2019). However, in this current study, despite their positive attitudes towards tasks and assignments provided in the blended learning environment, the findings show a low percentage of participation for many students on the assigned self-study. Although the participants realise the necessity of individual self-discipline to take responsibility for their online assignments, many of them did not put much effort and take responsibility for their independent study. The contrary outcome may be caused by students' time management spent on before-class assignments. Moreover, as discussed earlier in RQ4, this

issue might stem from difficulties to undertake self-study on their own, lack of independent learning skills, self-discipline towards their study, and additional workloads from other courses (Alshwiah, 2010; Saengsawang, 2013). Consequently, these can lead to lack of interests and motivation to spend their extra time undertaking the online assignments. This also lends support to some of the participants' viewpoint in demanding the face-to-face interaction and facilitation from teacher. Djiwandono (2013) indicated that teacher facilitation of the online content is still necessary for them, which may encourage them do their assignments regularly. Teacher facilitation may be needed to verify their out-of-class learning or check their understanding on the content, such as online or in-class Q&A sessions, discussion forums, surveys and quizzes (Francis, 2012; Hande, 2014). Furthermore, as they realise the importance or need of face-to-face interaction, it is in agreement with Banditvilai (2016) and Pertiwi (2018), who stated that teacher facilitation in a face-to-face session enables learners to ensure their understanding of the subject through the personal interaction, and it creates the feeling of connections or social interaction between teacher and students. In accordance with Hubackova et al. (2011), they added that the teacher is important and irreplaceable in foreign language teaching because students have an opportunity to consult or contact their teacher. This idea of personal interaction between instructors and learners is also related to what Dang et al. (2016) stated that factors that have significant impacts on their satisfaction towards the blended learning course were instructor characteristics and teacher facilitation. Therefore, this additionally supports the opinions from the independent teacher observations, that is, the face-to-face method possibly creates good rapport between them and leads to a comfortable or pleasurable atmosphere for successful learning.

Although students expressed their positive views towards blended learning instruction, some of them in this study shared less favourable views, such as effective internet connection, the coursebook content that may not correspond with their background or major, forgetting about taught words they learnt from the course, and factors that affect their vocabulary

knowledge retention. The reasons for their negative perceptions or attitudes may be in agreement with previous studies, that is to say, students may not seem to enjoy the teacher's blend of the digital tools and in-class activities (Tosun, 2015), the content and tasks might be difficult and limited to their language background knowledge (Karaaslan et al., 2018), and technical problems with computer networks and some drawbacks of the online tools that could hinder their language learning (Banditvilai, 2016). These results are also in agreement with the findings of Zumor et al. (2013), which showed that although students perceived technology used in the blended learning environment has improved their reading and vocabulary knowledge and brought them more confidence to learn language, including feedback and opportunities to communicate with peers and the teacher, there are some drawbacks of the approach, such as possibility of cheating, difficulties in studying online content, internet access issues, and technical problems. Therefore, these results may be taken to suggest that the tools used in the blended classroom setting should suit the students' proficiency, and they should be confident to use the equipment or online platforms that they are acquainted with, such as websites, blogs, learning management systems, and mobile communication applications (Tucker et al., 2017). Additionally, students should be provided with clear instructions for self-study, creating more effective online interactions, and pre-course training for students (Zumor et al., 2013).

Regarding class sizes, in general, classes in English courses are often large. In traditional classrooms, when the class size is large, it causes monitoring while doing activities and student engagement to be difficult. In the blended learning environment where technology is integrated, online tools and platforms are advantageous as they can decrease the difficulties in course management to facilitate students' learning and engage them in activities (Francis, 2012). In the same way, the flipped classroom, one of the blended learning models, is likely to engage a number of students, through the use of interactive technology, to focus on their learning and instruction (Danker, 2015; Roehl et al., 2013; Schell, 2012). From my point of view, as a teacher, with the large class size, incorporating online tools or platforms

into the instructional process enables instructors to manage the course conveniently. For example, in the blended learning setting, students' computers can be monitored while doing activities and they can view the content through their screen concurrently. Furthermore, employing paperless quizzes through the online platform is advantageous regardless of preparing sufficient copies for students as occurred in the traditional classroom. This is also in agreement with Krasnova and Sidorenko (2013) and Alaidarous and Madini (2016) indicating that using online platforms or a learning management systems, is perceived as a positive tool for students in English language courses because of the useful elements which enable the EFL courses to be manageable.

According to the students' opinions, they positively expect that the taught words they learnt will be useful in the future. Likewise, based on the independent teacher observations, the invited instructors are positive with the application and feasibility of blended learning for the future language courses. It is important to take things into consideration. For example, it is necessary to consider learners' needs or interests by probably conducting needs analysis before choosing the online or digital tools for a particular group of learners (Tosun, 2015). Consistent with the teacher observations and Lin (2011), which suggested to look at levels of content or text difficulty, and assessment should contain task authenticity that are applicable in the real contexts (Tulsi et al., 2016). Moreover, students seem to be more engaged in group work than individual work. Therefore, tasks and activities should be taken into account to suit their learning capabilities and characteristics which mainly affect their attention and participation in both out-of-class and in-class sessions.

Therefore, it seems that blended learning employs different learning approaches and strategies to maximise knowledge acquisition and skills development (Marsh, 2012). However, to make decisions for the appropriate blended learning direction, second or foreign language learning aspects (e.g. approaches, activities, or theories), in-class and out-of-class interactions and technology-integrated learning need to be taken into account (McCarthy, 2016), including other elements, such as learners'

preferences for learning methods, interaction, and achievement (Banados, 2006). Furthermore, students should be encouraged to be active through the learning process incorporating technology, both inside and outside the classroom, with guidance from teachers as the role of collaborators and facilitators (Banados, 2006). Hubackova et al. (2011) also suggested that, first, teachers should be trained to be able to use blended learning approaches effectively. Second, teachers should take students' autonomous learning skills into account, and encourage them to develop these skills and to have motivation to learn on their own. With respect to possible drawbacks attributed to the use of technology mentioned earlier, effective instructional multimedia formats should be provided to optimise learners' memory capacities. For example, task and technical complexities, which may occur during the online instruction, should be avoided (Pino, 2008). Finally, it is probably a proper idea to plan and select the appropriate technology to allow smooth transitions, content delivery, interaction, and learning achievement (Kalyuga, 2013).

5.2 Summary of this chapter

As the findings discussed through the various aspects and based on the research questions above, the current study revealed that the blended learning approach may not have an effective impact on EFL students' increase in vocabulary knowledge as expected, unlike other studies which found positive effects of the approach on students' language learning development. Moreover, my research experience regarding the blended learning instruction during the study suggested that the approach design should be thoroughly planned. To create a blended learning course, not only is it organised based on the course description and course objectives but also pre-pilot and pilot phases are necessary and recommended to conduct to prepare for the course. The pre-pilot phase is important as it obtains the information regarding learners' pre-existing level of knowledge and language proficiency, needs and readiness in terms of technology acquaintance and computer competency. It also provides ideas for the instructor to prepare the lesson plan and carefully select the content and use of online tools to suit the learners' styles and capabilities. After

preparing the content and materials, it would be better to trial them in the pilot phase to give an opportunity for improvement before real practice. Regarding my experience after this study, as creating a blended learning course requires hard work, it would be a better idea to work in a team. Furthermore, during the course feedback or opinions towards the instruction from students would be valuable for developing the course. In developing the blended learning course, apart from the design and pedagogy of course taken into account, other factors or extraneous variables might be involved with the students' learning outcomes. It is likely that a blended learning approach might be suitable for particular groups of learners -- but not all of them. To conclude the use of blended learning instruction with EFL university students, a summary of findings in this chapter will be drawn into the three following aspects based on the study dependent variables in this research: students' increase in vocabulary knowledge, vocabulary knowledge retention, and feasibility of a blended learning approach, presented in tables with the summary of findings, possible explanations, and suggestions.

5.2.1 Students' increase in vocabulary knowledge

Table 5.1 summarises the findings, possible explanations and overall suggestions regarding the first study variable (students' increase in vocabulary knowledge). Contrary to expectations, the blended learning method did not have an effective impact on the participants' vocabulary learning achievement. Moreover, female learners seem to show more capability in terms of language learning in the blended learning environment; therefore, it may be the case that gender difference seems to be one of the factors affecting vocabulary learning (Božinovic & Sindik, 2011; Mitchell et al., 2013; Oxford, 1993; Zoghi et al., 2013). To some degree, it is likely that blended learning is appropriate for those who possess a certain level of language abilities, with motivation, awareness of responsibility, self-discipline and autonomous learning skills (Gu, 2002; Liu, 2007; Maleki & Zangani, 2007; Salahshour et al., 2012; Yilmaz, 2010), as positive results shown in some particular classes.

Table 5.1 Summary of the discussion: Students' increase in vocabulary knowledge

Variable 1: Students' increase in vocabulary knowledge		
Findings	Possible explanations	Overall suggestions
<p>1) The control group had higher pre-existing vocabulary knowledge, performed better, and gained greater change than the experimental group.</p>	<p>Relying predominantly on the coursebook</p> <p>Student being more exposed to deliberate vocabulary learning</p> <p>Students' use of technology after class time</p> <p>Individual time spent on out-of-class activities</p> <p>Distractions and multi-tasking from computer use</p> <p>Class time constraints</p> <p>Amount of course content</p>	<p>More authentic assessment</p> <p>Relating more of vocabulary teaching to real contexts</p> <p>Adjusting amount of learning objectives and content</p> <p>Focusing active learning with more teacher facilitation and guidance</p>
<p>2) Females had higher language proficiency and pre-existing vocabulary knowledge.</p> <p>Females performed better in enhancing their vocabulary than males.</p> <p>Females gained as approximate change in vocabulary knowledge as males.</p>	<p>Content's level of difficulty</p> <p>Learners' intrinsic motivation towards language learning</p> <p>Differences in learners' characteristics and gender</p>	
<p>3) Engineering and architecture students had similar language proficiency and pre-existing vocabulary knowledge.</p> <p>Engineering major performed better and gained more change in vocabulary knowledge.</p>	<p>Differences in learners' characteristics and academic majors</p> <p>Content limited to their background knowledge</p> <p>Students' workloads</p> <p>Language proficiency and pre-existing knowledge may partially affect vocabulary learning, but the instructional process and other extraneous variables (mentioned above) tend to play the main role.</p>	
<p>4) Class 2 (Control group) and class 3 (Experimental group) had an approximate level of vocabulary knowledge.</p> <p>Class 3 gained the greatest change in vocabulary knowledge.</p> <p>Class 5 (Experimental group) performed the lowest and gained the lowest change of vocabulary knowledge.</p>	<p>Content limited to their background knowledge</p> <p>Students' workloads</p> <p>Language proficiency and pre-existing knowledge may partially affect vocabulary learning, but the instructional process and other extraneous variables (mentioned above) tend to play the main role.</p> <p>The blended learning may be effective in some particular classes or groups of students.</p>	

It is important to bear in mind that the teaching methods and instructional process might not have a main impact on students' increased knowledge.

Other out-of-class activities in English language that are not related the instruction, such as students' own choices of language practice, academic work in other courses, or extra reading activities, may play a part in their vocabulary knowledge as well. Regarding the course content, levels of difficulty, the quantity of taught content, and learners' prior knowledge should be taken into consideration (Lin, 2011; Tosun, 2015). Moreover, the content should be adjusted to suit the learners' background and characteristics. The 'less is more' concept is still practical for them, especially in the language learning contexts where students need more practice with the appropriate amount of learning input to meet their learning capacity and ability.

5.2.2 Vocabulary knowledge retention

Another studied dependent variable is vocabulary knowledge retention. Comparing to the traditional class, students in the blended learning environment had a decrease in their vocabulary knowledge at the similar rate, during the course and after the course ended. In terms of gender, females tended to have better knowledge retention during the course, but after the course both genders' vocabulary knowledge was likely to decrease approximately. As can be seen, some particular classes gained significantly greater change in knowledge retention than the others. It is possible that teaching methods in the two different learning settings do not have an overall impact to such extent that students can retain their vocabulary knowledge differently (Arfaorafiee & Ameri-Golestan, 2015). The instruction may have part of the effect on specific groups of learners. One important factor that mainly affects their knowledge recall and retention is regular use of the language or vocabulary (Arthur et al., 1998; Ritter et al., 2013). Due to lack of the regular use after the course, all participants are not likely to recall taught vocabulary to the same degree. From this study, the findings may help us to provide more meaningful repeated practice, an appropriate amount of follow-up tests, and progress tests could be used to examine their development during the course (McTighe & Seig, 2014; Wheeler et al., 2010). After the course, additional language courses and an exit exam before graduation should be provided. Table 5.2 summarises the key

findings related to this study variables, including the possible explanations and suggestions to the issues.

Table 5.2 Summary of the discussion: Vocabulary knowledge retention

Variable 2: Vocabulary knowledge retention		
Findings	Possible explanations	Overall suggestions
<p>1) The control and experimental groups had the similar rate of decrease and change in vocabulary knowledge retention.</p>	<p>Lack of sufficient rehearsal or overlearning after class</p> <p>Surface learning and rote memorisation occurred.</p> <p>Lack of intrinsic motivation</p> <p>Lack of regular use of vocabulary</p> <p>Class time limits</p> <p>Students' time spent outside the classroom</p> <p>Students' workloads</p> <p>Declarative knowledge occurred, not transferred to the level of procedural knowledge</p> <p>Excessive amount of tests</p>	<p>Well-designed rehearsal during the course</p> <p>More appropriate amount of tests for vocabulary recall</p>
<p>2) Females retained higher vocabulary knowledge during the course than males.</p> <p>Females and males had similar change of knowledge retention after the course.</p>	<p>Differences in learners' characteristics, gender, and academic majors</p>	<p>Follow-up exercises or tests</p> <p>Follow-up training courses</p> <p>Exit exam before graduation</p>
<p>3) Class 3 (Experimental group) performed the best and gained the highest change in knowledge retention during the course.</p> <p>All classes had the similar rate of change in knowledge retention after the course ended.</p>	<p>Language abilities and pre-existing vocabulary knowledge may affect the rate of knowledge retention.</p>	

5.2.3 Feasibility of the blended learning approach

With respect to the last study variable, we look into the extent to which the use of blended learning is feasible in EFL classrooms. Although students have positive perceptions or attitudes towards the blended learning environment, their learning outcomes may not be correlated with the responses, due to several factors, such as differences in gender (Božinovic & Sindik, 2011; Mitchell et al., 2013; Oxford, 1993; Zoghi et al., 2013) and

learners' characteristics (Phonhan, 2016; Viriya & Sapsirin, 2014; Yilmaz, 2017), motivation (Alshwiah, 2010; Marton & Saljo, 1997; Ryan & Deci, 2000), their additional workloads in other courses and pre-existing background knowledge (Alshwiah, 2010; Karaaslan et al., 2018; Saengsawang, 2013), and language proficiency (Gu, 2002; Salahshour et al., 2012; Yilmaz, 2010), including the familiarity of computer use and time management in their study (Tehrani & Tabatabaei, 2012). However, it is noted that blended learning is worth using in academic courses, especially the flipped classroom model which is appropriate for language courses and allows large classes to be manageable by incorporating technology or online tools to assist the instructors to organise the course (Francis, 2012; Schell, 2012). Furthermore, the demand for interaction with the teacher is still important for language learners as it brings about confirming their understanding and guidance towards the learning content. In terms of students, we may need to be concerned about their learning capabilities related to differences in gender, characteristics, academic majors, language abilities and prior knowledge related to academic background. In regard to instructors, they should consider content difficulty, relevant assessment to real contexts, and proper use of technology-mediated tools. When teaching those with low language proficiency, more teacher facilitation and guidance may also be required, with more thorough class monitoring. Table 5.3 shows summary of discussion regarding the feasibility of the blended learning, which consists of the key findings, possible explanations and overall suggestions to this aspect.

Table 5.3 Summary of the discussion: Feasibility of a blended learning approach

Variable 3: Feasibility of a blended learning approach		
Findings	Possible explanations	Overall suggestions
1) Students' positive perceptions and attitudes towards the course in the blended learning environment	<ul style="list-style-type: none"> Students enjoyed game activities. Students' active participation in group work Students' good computer skills (above average level) and acquaintance with technology Convenience and interactivity of the blended learning More opportunities for collaboration and communication both inside and outside the classroom 	

Variable 3: Feasibility of a blended learning approach		
Findings	Possible explanations	Overall suggestions
	<p>Students realise the importance of teacher facilitation and interaction</p> <p>Benefits of online platform that they can re-watch taught content and download materials.</p> <p>Students' expectations to use taught words in the future</p>	<p>Content's level of difficulty</p>
<p>2) Students' unfavourable views</p>	<p>Irrelevance of the coursebook content to their background knowledge and academic major</p> <p>Lack of regular use of vocabulary can cause forgetting</p> <p>Requirement of self-discipline for online self-study</p>	<p>Careful selection of technology-mediated tools</p> <p>More authentic tasks for assessment</p>
<p>3) Teachers' views on the feasibility of the future blended learning course</p>	<p>Differences in learners' characteristics</p> <p>Good rapport between teacher and students creates comforts and a good learning atmosphere.</p> <p>Blended learning instruction may be suitable for particular groups of learners.</p> <p>Requiring teacher's readiness and willingness to prepare the course materials</p> <p>Students' demand of face-to-face interaction</p> <p>Feasible for other courses, but requiring the majority of face-to-face interaction</p> <p>Content differed from students' background knowledge and major.</p> <p>Based on the teachers' perspective, use of technology is convenient to manage the course and go paperless.</p> <p>Large class sizes caused difficulty of monitoring in the traditional class.</p> <p>A large class size is manageable in the blended learning setting.</p>	<p>Training required for teachers and students before the course starts</p> <p>More thorough class monitoring</p>

Having discussed the findings and possible causes or explanations, the conclusion of this study will be presented in the next chapter, including limitations, implications and recommendations for future work.

6. Conclusion

6.1 Introduction

The empirical phase of the current research lasted approximately six months and was conducted at one university in Bangkok, Thailand. It used a quasi-experimental design with a sample of 146 students, from four intact classes, in English for Industrial Management course. As mentioned in the introduction chapter that English is learnt as a foreign language in Thailand, vocabulary is an important foundation for language learning and practical use for EFL learners. It is essential not only for the communicative functions but also academic and future career purposes. Therefore, it is necessary for learners to increase their vocabulary and retain word knowledge in order to be able to use English language to serve those purposes effectively and successfully. However, with the limitations of the conventional teaching methods as lectures in the English language classroom may cause rote learning or memorisation to pass tests, and hinder satisfying language learning outcomes. Moreover, large class sizes often occur in the language courses, which can decrease opportunities for students to have effective one-to-one interaction and practice, and for teachers to have thorough class monitoring. Another issue was relevant to the cost and time effectiveness of education management at the university, which is comprised of three campuses in different locations and requires instructors to commute to the campuses. Furthermore, there is the evidence of students' national test results with low average test scores in English subject and a survey revealed unsatisfying responses from business or companies employers in graduates' knowledge and performance. Thus, to cope with the situation and limitations, blended learning is an approach which might offer the solution because it focuses learner-centeredness and enhances learners' vocabulary knowledge and knowledge retention, through an emphasis on face-to-face and technology-mediated methods. This also corresponds to a part of the guidelines referred to Thailand's National Education policy which requires technologies to be engaged in learning, and needs learners to acquire skills and language knowledge in order to serve the country's manpower

development. Therefore, the aims of the present research were to investigate learners' increasing vocabulary knowledge and vocabulary knowledge retention through the use of blended learning, and to examine the feasibility of a blended learning approach in an EFL course at the tertiary level in Thailand.

The present study contributes to existing knowledge of the feasibility of blended learning by providing insights for the potential of blended learning instruction on vocabulary learning which supports the extent of increasing vocabulary knowledge and vocabulary knowledge retention for Thai EFL university students. This is accomplished by examining different facets apart from their vocabulary development, their perceptions and attitudes. The findings of the study are relevant to both practitioners and policy-makers, that is, it corresponds to the national education policy that put the emphasis on manpower development in science and technology, and it could be used to help guide to create effective language courses in order to produce graduates with capable language skills and knowledge for work. Moreover, the present study provides a framework for teachers who wish to initiate meaningful English language lessons incorporating the use of technology to enhance students' vocabulary knowledge and knowledge retention. With respect to the university's educational administration, the evidence from the study should prove useful in cost and time effectiveness for instructional management and organisation in different locations of the university campuses.

This study set out to answer seven research questions which looked into the extent of the feasibility through the aspects of the participants' increasing vocabulary knowledge, vocabulary knowledge retention, gender differences, variation in academic majors, different registered classes, relationships between language proficiency, vocabulary knowledge and knowledge retention, including their perceptions and attitudes towards the blended learning environment. This conclusion chapter provides the key findings and discussion, limitations of the study, implications, and suggestions for future work.

6.2 Summary of the key findings and discussion

In this section, the key findings and discussion are reviewed and summarised in relation to the following aspects that answered each research question, alongside the summary tables presented with the major results and key explanations, including agreement and disagreement of the current study's findings with previous studies.

6.2.1 Increasing vocabulary knowledge

Table 6.1 shows the summary of the key findings in this aspect that agreed or disagreed with relevant previous studies.

Table 6.1 Summary of the key results and explanations: Increasing vocabulary knowledge

Increasing vocabulary knowledge			
Key results	Key explanations	Agreement/ Disagreement with relevant previous studies	
		Agreement	Disagreement
Higher change of vocabulary knowledge in the control group	<p>Insufficient context-based vocabulary instruction</p> <p>Individual preferences of computer use and time spent on out-of-class activities</p> <p>Distractions and multi-tasking during the computer use</p> <p>Task difficulties, problems and complexities during the online study</p>	<p>Alshwiah (2010)</p> <p>Arfaorafiee and Ameri-Golestan (2015)</p> <p>Gross (2014)</p> <p>Tosun (2015)</p>	<p>Alnuhayt (2018)</p> <p>Banditvilai (2016)</p> <p>Chen (2018)</p> <p>Djiwandono (2013)</p> <p>Djiwandono (2018)</p> <p>Ja'ashan (2015)</p> <p>Jia et al. (2012)</p> <p>Jung and Lee (2013)</p> <p>Karaaslan et al. (2018)</p> <p>Khalili et al. (2015)</p> <p>Khodaparast and Ghafournia (2015)</p> <p>Maria and Othman (2015)</p> <p>Mashhadi et al. (2016)</p> <p>Nanclares and Rodriguez (2016)</p> <p>Pertiwi (2018)</p> <p>Sun (2016)</p> <p>Suwantarathip and Orawiatnakul (2015)</p> <p>Tehrani and Tabatabaei (2012)</p> <p>Vasbieva, Klimova, Agibalova, Karzhanova, and Birova (2016)</p> <p>Zhang et al. (2016)</p>

In the first aspect, a statistically significant difference occurred between the two studied groups indicated that there was higher change in the control group. In other words, the blended learning approach might not have a positive effect on the experimental group. The possible explanations for these findings are concerned with relying predominantly on the coursebook

which may cause lack of balance between deliberate and contextualised vocabulary instruction (Nation, 2003), students' preferences for the use of technology after class time, efficiency of individual time spent on out-of-class activities, distractions and multi-tasking from computer use (Fried, 2007; Wood et al., 2012), and difficulties, technical problems, task complexities occurred during the online study (Engin, 2014b; Herreid & Schiller, 2013; Hsieh et al., 2017; Ping et al., 2019; Pino, 2008).

6.2.2 Vocabulary knowledge retention

In the second aspect regarding vocabulary knowledge retention, as shown in Table 6.2, the key results revealed that the two study groups were likely to retain vocabulary knowledge at the similar rate. However, looking into the effect size, the control group tended to have a more positive impact of instruction in the traditional setting.

Table 6.2 Summary of the key results and explanations: Vocabulary knowledge retention

Vocabulary knowledge retention			
Key results	Key explanations	Agreement/ Disagreement with relevant previous studies	
		Agreement	Disagreement
<p>Key results: Similar decrease rate of knowledge retention between the two groups. Based on the effect size, a more positive impact of instruction in the traditional setting on the control group</p>	<p>Involvement of rehearsal and rote memorisation within time constraints to pass tests</p> <p>Difficulties to have deep learning</p> <p>Lack of intrinsic motivation to become a deep learner</p> <p>Lack of regular use of taught content or vocabulary</p> <p>Interference of workloads or content in other courses</p>	Arfaorafiee and Ameri-Golestan (2015)	Have (2012) Zhang et al. (2016)

This is possibly explained by engagement of rehearsal and rote memorisation within time limits to pass tests (Lujan & Dicarolo, 2006; Woodward et al., 1973), difficulties to become a deep learner (Draper & Waldman, 2013; Haggis, 2003) due to lack of intrinsic motivation (Marton & Saljo, 1997), lack of regular or sufficient use of taught vocabulary (Anderson, 1995; Bacon & Stewart, 2006), and interference of workloads in other academic courses (Arthur et al., 1998; Ritter et al., 2013).

6.2.3 Gender differences

As the summary presented in Table 6.3, the aspect of gender sought to explore the difference derived from the test scores between male and female participants. The key results indicated that, within the experimental group, females had a higher level of language proficiency, vocabulary knowledge and knowledge retention. It might be caused by existing differences between males and females in language learning performance (Božinovic & Sindik, 2011; Mitchell et al., 2013; Oxford, 1993; Zoghi et al., 2013), distinct mechanism of memory systems (Kaushanskaya et al., 2011; Lin, 2011), attitudes in technology mediation in a blended learning course (Al-Fadhli, 2008; Dang et al., 2016), motivation in language learning or academic study (Dhakai, 2018; Kobayashi, 2002; Yilmaz, 2010), and greater interaction in classroom or out-of-class activities (Graff, 2003; Naaj et al., 2012; Yoon & Lee, 2010).

Table 6.3 Summary of the key results and explanations: Gender differences

Gender differences			
Key results	Key explanations	Agreement/ Disagreement with relevant previous studies	
		Agreement	Disagreement
Females had a higher level of language proficiency, vocabulary knowledge and vocabulary knowledge retention	Differences in: language learning performance mechanism of memory systems attitudes in the use of technology motivation in language learning or academic study greater interaction in classroom or out-of-class activities	Božinovic and Sindik (2011) Gu (2002) Kaushanskaya et al. (2011) Lin (2011) Mitchell et al. (2013) Ok (2003) Okaz (2015) Oxford (1993) Salahshour et al. (2012) Yilmaz (2010) Zoghi et al. (2013)	Grace (2000) Phonhan (2016) (Viriya & Sapsirin, 2014)

6.2.4 Different academic majors

As the summary shown in Table 6.4, based on participants' different academic majors, engineering and architecture, a statistically significant difference indicated that the engineering students gained greater change in vocabulary knowledge than the architecture students. Although their pre-existing vocabulary knowledge revealed no difference at the beginning of

the course, the possible explanations of the results might be concerned with different degree of intrinsic motivation (Hu et al., 2011; Loob, 2001; Marton & Saljo, 1997), learning capabilities and characteristics of an individual learner and different academic majors (Gu, 2002; Phonhan, 2016; Ryan & Deci, 2000), study workloads (Saengsawang, 2013), and responsibility and willingness that affect the rate of participation in the assigned tasks (Alshwiah, 2010; Karaaslan et al., 2018).

Table 6.4 Summary of the key results: Different academic majors

Different academic majors			
Key results	Key explanations	Agreement/ Disagreement with relevant previous studies	
		Agreement	Disagreement
Engineering students' greater change in vocabulary knowledge than the architecture major	Variation in intrinsic motivation Different learning capabilities and characteristics of an individual learner and different majors Additional study workloads Responsibility and willingness to participate in assignments or tasks	Driscoll and Garcia (2000) Gu (2002) Ictenbas and Eryilmaz (2011) Phonhan (2016) Tulsi et al. (2016)	Brow et al. (1994) Demirbas and Demirkan (2003) Demirbas and Demirkan (2007) Demirkan and Demirbas (2010) Kvan and Yunyan (2005)

6.2.5 Different registered classes

According to the aspect of difference between the registered classes, as the summary presented in Table 6.5, the key results indicated that some particular classes gained greater change in vocabulary knowledge and knowledge retention. In other words, the blended learning environment might be appropriate for some specific groups of students. This may reflect differences between the classes in: perceptions and attitudes towards the instruction (Banditvilai, 2016; Tosun, 2015), motivation in online and out-of-class assignments (Alshwiah, 2010; Karaaslan et al., 2018), language proficiency that affects motivation and attitudes in language learning (Gu, 2002; Liu, 2007; Maleki & Zangani, 2007; Salahshour et al., 2012; Yilmaz, 2010), characteristics and learning capabilities (Afshar et al., 2014; Tulsi et al., 2016). Furthermore, there might be additional reasons, such as limited background knowledge, difficult activities, heavy study workloads, and

difficulty in becoming an independent learner (Alshwiah, 2010; Karaaslan et al., 2018).

Table 6.5 Summary of the key results and explanations: Different registered classes

Different registered classes			
Key results	Key explanations	Agreement/ Disagreement with relevant previous studies	
		Agreement	Disagreement
Blended learning instruction might be effective for some particular groups of students.	Limited background knowledge Too difficult content or activities for learners Heavy study workloads Difficulty in independent learning Differences in: perceptions and attitudes towards the blended learning instruction motivation to do the out-of-class assignments language proficiency that affects motivation and attitudes in language learning learners' characteristics and learning capabilities	Alshwiah (2010) Banditvilai (2016) Karaaslan et al. (2018) Tosun (2015)	---

6.2.6 Relationships between language proficiency, vocabulary knowledge and vocabulary knowledge retention

This aspect sought to examine the extent of relationships between students' English language proficiency, pre-existing vocabulary knowledge, increasing vocabulary knowledge and vocabulary knowledge retention. The key findings indicated that the level of language proficiency and pre-existing vocabulary knowledge might not confirm an increase in vocabulary knowledge. This is probably due to the changeable learning conditions and environments, which might affect learner's vocabulary knowledge acquisition and memory (Meara, 1996; Waring, 2016). Furthermore, the results revealed a high correlation between language proficiency, pre-existing vocabulary knowledge and knowledge retention. This may reflect the influence of language abilities on learners' vocabulary knowledge, the rate of word retention, and language learning achievement (Salahshour et

al., 2012; Yilmaz, 2010). Accordingly, a degree of language proficiency may have the impact on learners' motivation and attitude in language learning and academic success (Gu, 2002; Liu, 2007; Maleki & Zangani, 2007). The summary of the major results and key explanations are presented in Table 6.6.

Table 6.6 Summary of the key results and explanations: Relationships between language proficiency, vocabulary knowledge and vocabulary knowledge retention

Relationships between language proficiency, vocabulary knowledge and vocabulary knowledge retention			
Key results	Key explanations	Agreement/ disagreement with relevant previous studies	
		Agreement	Disagreement
An increase of vocabulary knowledge may not be relevant to the level of language proficiency and vocabulary knowledge at the beginning of the course.	Changeable learning conditions and environments	Gu (2002) Liu (2007) Maleki and Zangani (2007) Salahshour et al. (2012) Yilmaz (2010)	---
Positive relationships between language proficiency, pre-existing vocabulary knowledge and knowledge retention	Language abilities have the influence on vocabulary knowledge, knowledge retention, language learning achievement, motivation and attitude in language learning, and academic success.		

6.2.7 Feasibility of a blended learning approach

As summarised in Table 6.7, the last aspect explores the feasibility of the blended learning instruction through observations, students' perceptions and attitudes. First, it indicated that their positive views on the approach. The possible explanations for the positive results may be concerned with students' positive perceptions of their above average skills of computer knowledge (Gülbahar & Madran, 2009; Tehrani & Tabatabaei, 2012), technology and online platforms which increase opportunities for a challenging learning atmosphere (Jung & Lee, 2013; Suwantarathip & Orariwatnakul, 2015; Tosun, 2015), enjoyment through the use of technology mediation (Karaaslan et al., 2018; Maria & Othman, 2015). Second, there are possible factors that cause variation in students' attention and participation in class, such as different characteristics, difficulty in

independent learning, study time management, lack of interests, motivation and self-discipline, and additional workloads (Alshwiah, 2010; Saengsawang, 2013).

Table 6.7 Summary of the key results and explanations: Feasibility of a blended learning approach

Feasibility of a blended learning approach			
Key results	Key explanations	Agreement/ disagreement with relevant previous studies	
		Agreement	Disagreement
Students' positive perceptions and attitudes towards blended learning instruction	Above average level of computer knowledge Enjoyment and challenging learning atmosphere through the use of technology	Banditvilai (2016) Djiwandono (2013) Jung and Lee (2013) Karaaslan et al. (2018) Khalili et al. (2015) Maria and Othman (2015) Mashhadi et al. (2016) Pertiwi (2018) Suwantarathip and Orawiwatnakul (2015) Tehrani and Tabatabaei (2012) Tosun (2015)	---
Variation in class attention and participation	Different learners' characteristics Difficulties to be an independent learner Students' time management Additional workloads Lack of interests, motivation and self-discipline in the assigned tasks		
Some less favourable views on the blended learning environment	Irrelevant content to their background or major Forgetting occurs due to lack of opportunities to use taught words Internet and technical problems		
The feasibility and benefits of the flipped classroom for English courses which needs learning through practice	Necessity of teacher facilitation, face-to-face interaction with peers and teacher Good rapport between teacher and students leading to comfortable learning atmosphere Benefits of the use of technology in large class management		

The students also revealed some less favourable views on blended learning instruction, due to irrelevance of the content to their background or

academic major (Karaaslan et al., 2018), forgetting taught words caused by lack of regular use, and internet and technical problems (Banditvilai, 2016). From the independent teacher perspectives, the flipped classroom instruction is suitable and useful for English language courses as English is a skill subject which still demands practice through face-to-face interaction with peers and teacher facilitation and (Banditvilai, 2016; Djiwandono, 2013; Francis, 2012; Hande, 2014; Hubackova et al., 2011; Pertiwi, 2018), good rapport between teacher and students to create pleasurable learning atmosphere (Dang et al., 2016), and benefits of technology mediation and online platforms in (large) class management (Danker, 2015; Krasnova & Sidorenko, 2013; Roehl et al., 2013; Schell, 2012).

6.3 Contributions of the study

The increase of online or technology-mediated learning has brought a wide impact on education and pedagogy. However, in English courses, one-to-one interaction, practice and feedback are crucial in order to enhance language skills. Hence, the present study fills a gap in the literature by examining the findings through multifaceted explorations to contribute a unique insight into the feasibility of a blended learning approach for Thai EFL students at the tertiary level. Not only does the study investigate the main dependent variables (increasing vocabulary knowledge, vocabulary knowledge retention, and perceptions and attitudes of the blended learning method) but also additional explorations for feasibility, similarities and differences existing in gender, academic majors, different registered classes, and relationships between language proficiency, vocabulary knowledge and knowledge retention.

The findings and conclusions of this study thus have significance from four main angles: national education policy, the university's action plan, English language teaching, and specific contribution as a doctoral study, as explained in the following perspectives:

• *Thailand's national education policy*

The information derived from this study may support the government's policy that focuses manpower development in science and technology. The findings could lead to more effective English language instruction at

the tertiary level to help produce and develop graduates who are skilled and capable of working for industries or organisations.

- ***The university's educational action plan***

By involving three campuses at the university, the research outcomes would take an important part to initiate meaningful blended learning courses to help the university in terms of time saving and cost reduction for course and instruction management in the different locations of campuses.

- ***English language teaching***

The outcomes are likely to provide the guidance for English language teachers at the tertiary level to become aware of important factors before creating a blended learning course, to be selective for incorporating appropriate technology into their courses, and to design a meaningful blended learning course to support university students in their language learning. Initiating the meaningful blended learning course will also optimise their vocabulary learning and assist them to be able to retain their vocabulary knowledge for future use, especially for their future work and effective language use in order to meet the expectations of employers and industries.

- ***Specific contribution as a doctoral study***

The findings from this study could make a specific contribution within the Thai EFL context in relation to the differences between the nature of studied subjects. It is important to note that the negative results from this study provide a warning note about the enthusiasm for the idea of blended learning instruction and use of technology that may not work in every context or with every learner. In other words, the study suggests that blended learning is feasible, but in fact, it might not benefit all students in Thai EFL contexts as we learnt that differences exist in different types of students, and various aspects of their language learning should be taken into account. Moreover, this empirical study is distinct as it was established in the Thai tertiary context which looked at the follow-up data after the course ended and different aspects of language learning, i.e. gender, academic majors, different registered classes, and

relationships between language proficiency, pre-existing knowledge, increasing vocabulary knowledge and vocabulary knowledge retention.

6.4 Limitations of the study

As typically occurred in any other research, there are certain limitations in this study which should be acknowledged and could be guidance to avoid for similar future studies. First, the main limitation is the lack of random assignment because of the intact groups provided by the university. As a result, this study was conducted in a quasi-experimental design where random allocation was not possible. Furthermore, pre-existing differences or influences in the groups can occur in this kind of experiment, which limits the possibility to generalise and draw conclusions that rely on valid causal inferences from the design (Cook & Campbell, 1986; Fraenkel et al., 2012; Phakiti, 2014; "Research Ready: Quasi-Experimental Research," n.d.; Thomas, 2009). However, one strength of this design is that it creates a more natural setting and can provide some useful insights into a causal relationship and feasibility explorations of a particular approach (Bryman, 2016; Cook & Campbell, 1986; Phakiti, 2014; "Research Ready: Quasi-Experimental Research," n.d.). Moreover, it is also important to identify a history effect that may occur in this study where particular situations, such as students' out-of-class activities or preferred extra language practice, intervene during the experiment and probably affects changes in the studied dependent variables (Phakiti, 2014). Therefore, although it is impossible to eliminate this type of threat with random assignment or a control condition, the comparison or control group allocated in this study ensures that the effect may not be the main reason of the differences or changes in the participants (Dane, 2018) and can assist to draw wider inferences (Creswell, 2012; Drummond & Murphy-Reyes, 2018; Scher et al., 2015).

Second, a small sample size of the intact classes at one university used in this study may cause generalisations to be inapplicable to other learners or settings. The reader should bear in mind that the obtained results may illustrate the context of this study where a limited number of participants with distinct characteristics and learning capabilities were evaluated in a particular environment. However, the findings of this current study may be

transferrable to a population of students with similar characteristics of the participants or settings (Phakiti, 2014). Another potential problem is that a limited sample size of participants occurred during the delayed test administration. Due to the issue of the students' new term time's schedule, there was lack of participation by students from one particular academic major (architecture) in the comparison of vocabulary knowledge retention between the two different academic majors and in different classes. Consequently, part of knowledge retention assessment, in relation to the architecture major students, might not be able to adequately illustrate and address to the research questions.

Third, at the fieldwork site, during the data collection, I possessed a dual role of researcher and teacher, or so called researcher-teachers, who "...go into the practice of teaching in order to conduct their research in a class that they themselves are teaching" (Tabach, 2006, pp. 235-236). Regarding the dual role, it may be advantageous in terms of convenience in course management, following what is planned and designed in the research, and adaptability in case of modifications to activities. On the other hand, it may have influenced the course and research in a way that probably affects the investigation by experiencing moving between these two roles (Tabach, 2011). However, as a researcher, I am aware that I should not impinge upon the study and I should overcome the dilemmas by separating these roles and not influencing or changing instruction through the researcher's perspective and interpretations.

6.5 Implications

In the light of the findings and evidence in the current study, implications to the bearings on practicality and research are made in relation to vocabulary learning and teaching, knowledge retention, and feasibility of blended learning instruction, as follows.

6.5.1 Vocabulary learning and teaching

In terms of practical implications, the current data suggest the importance of vocabulary instruction which should emphasise the balance of deliberate and real-context based content and activities (Nation, 2003), which enhance students' abilities to learn words through real contexts (Hulstijn, 2001;

Nemati, 2009; Oxford, 1990). Furthermore, as a coursebook was mainly employed in the course instruction, the content may rather be focused on word forms and meaning than contextualised vocabulary teaching (Brown, 2010). Thus, the results of this research support the consideration in using a coursebook and selecting the appropriate learning content to correspond with learners' background knowledge. Regarding the research implications, the negative results of this study raised important theoretical issues that have a bearing on selected vocabulary teaching methods which might not have a positive impact on every group of participants. Hence, this might raise important questions about the relevant factors to particular groups or settings in conducting research.

6.5.2 Vocabulary knowledge retention

Apart from the importance of increasing vocabulary knowledge, retaining it is also crucial for future use. The principal theoretical implication of this study is the understanding of how information is perceived and stored in short-term and long-term memory and the notion of memory functions that takes part in language learning, which may help language learners and teachers understand the process of what is learnt. As a consequence, the findings and this understanding may well have a bearing on designing appropriate amount of rehearsal or tests for taught words and content, in order for students to have opportunities to practice and use vocabulary regularly. Another implication of this is the possibility to create an opportunity that encourages learners to be exposed to deep learning instruction which enables them to have a better rate of knowledge retention (Garrison & Vaughan, 2008; Ramsden, 2003). In terms of research work, the theories that underpinned this study may have implications for conducting further research in cognitive language learning or vocabulary teaching techniques that may assist learners in better vocabulary knowledge retention.

6.5.3 Feasibility of blended learning instruction

Looking into the implications from the feasibility of blended learning instruction in language learning, the unexpected results of vocabulary learning achievement in this study indicate that the approach might not be

suitable for every group of learners and every type of language lesson (Gross, 2014). Therefore, the findings suggest the possibility of the blended learning potential, but may require teachers to take multifaceted consideration in the course or lesson design and planning, such as learners' characteristics and capabilities, differences in gender or academic majors, their background knowledge, variation in language abilities and pre-existing knowledge, including selection of appropriate technologies for learners and lesson presentation. In terms of proportion of the blends, the current study support the presence of personal interaction with peers and teachers, and the necessity of teacher facilitation (Djiwandono, 2013; Francis, 2012; Hande, 2014). Furthermore, regarding characteristics of Thai EFL learners, assistance from the teacher is still necessary in foreign language learning contexts (Hubackova et al., 2011). Hence, the evidence from this study suggests that the appropriate blended proportion, in percentage, between online and face-to-face methods might be 30:70 or 20:80. The use of the flipped classroom instruction in this research also raised the importance of the teachers' role in promoting learners to take responsibility in before-class sessions by providing incentives or relate the online self-study to a part of course evaluation. In terms of research work, the phases (pre-pilot, pilot, main study) in this current study have significant implications for other empirical research that might create a blended learning course by conducting a need analysis, trialling the lessons, and receiving learners' feedback to improve the course (Tucker et al., 2017), in order to extract the useful information regarding students' needs, preferences, existing knowledge and readiness.

6.6 Recommendations for future practice and research

Having had different findings from the positive results found in a majority of other studies in the use of blended learning on vocabulary learning, the current study has shown that the approach might not be as effective as expected. However, it might suit a particular group or an individual learner and need to take several factors into account in creating the course. In the light of these findings and literature, recommendations for further practice

and research work are drawn into the following aspects: English language instruction, knowledge retention, and the use of blended learning instruction.

6.6.1 English language instruction

Regarding the future instructional practice, other potential vocabulary teaching techniques should be examined and sought to derive utmost vocabulary development. Furthermore, more context-based subject matters and authentic assessment and materials should be taken into account in relation to quantity and time constraints, and should put the emphasis on learning outcomes and knowledge application. In terms of further research, it would be interesting to compare between other different majors at the university or other institutions, and to examine other variables, such as attitudes in autonomous learning, academic results, learning preferences, characteristics, and language performance. It is also suggested that the relationship of these variables is investigated in future studies. Further investigation and surveys of recent trends and situations in language or vocabulary knowledge used in work contexts should be made.

6.6.2 Knowledge retention

During the years of study, students' language knowledge retention should be promoted by providing opportunities for regular use, such additional training courses, mandated consecutive language courses, and a language proficiency test before their graduation. In regard to further investigation in knowledge retention, it is recommended that research be undertaken in graduates who work for organisations and industries. It would be interesting to determine the factors that associate with their knowledge application and retention during their work, and to explore the expectations for the prospective workers from employers.

6.6.3 The use of blended learning instruction

To incorporate the blended learning approach into EFL classrooms, it is recommended that training sessions be provided for teachers to support them in the areas of awareness of the benefits in using an instructional method, the appropriate use of technology, and readiness for handling the course. Likewise, there should be a preparatory week for students in relation to informing learning objectives, an overview of the course content

and selected technology for the course management. Furthermore, universities or educational institutions are required to equip the instructional settings with infrastructure, such as ubiquitous and effective internet connection, computer facilities, classroom equipment, accessible learning management system and applications, and technical aids. With respect to research work, further studies need to be done to explore teaching experiences in the blended learning environment through the instructors' perspectives. Moreover, apart from research in educational contexts, it would be interesting to investigate the feasibility of a blended learning approach in consecutive trainings for employees in business organisations in future studies.

6.7 Conclusion to this chapter

The present study provides the multifaceted explorations for the feasibility of a blended learning approach which supports vocabulary learning to enhance EFL students' vocabulary knowledge and vocabulary knowledge retention at the Thai tertiary level. Figure 6.1 illustrates conclusion of the thesis.

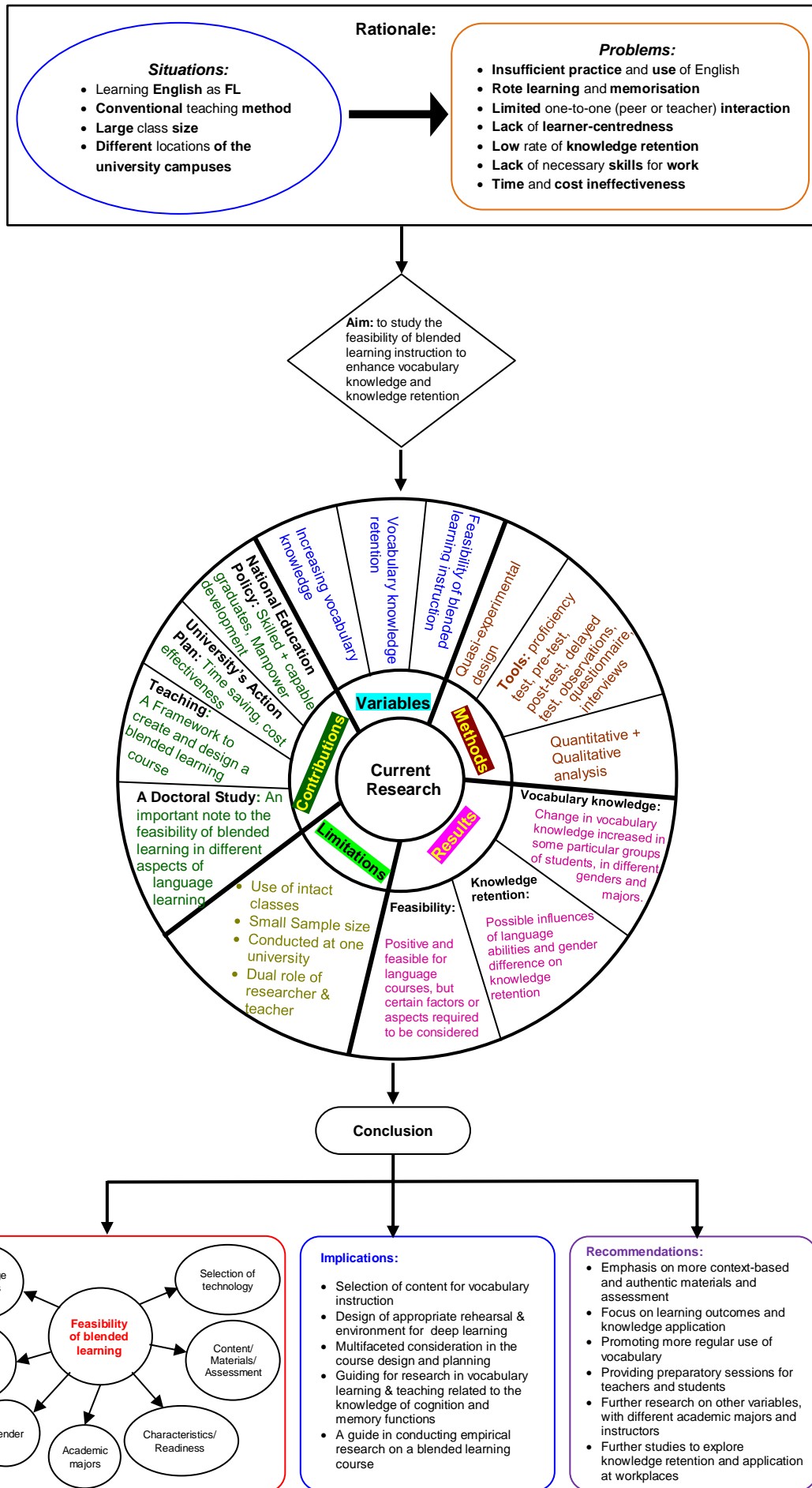


Figure 6.1 Conclusion of the present study

As the diagrammatic chart of conclusion of the thesis illustrated in Figure 6.1, the problems derived from the context of EFL learning, the teaching method, class size and the university's educational administration caused surface learning, insufficient use and practice in English language and vocabulary, limited in-class one-to-one interaction and learner-centeredness, and a low rate of knowledge retention which might affect the university students in further academic study and a lack of necessary skills for their future career. As a result, the combination of the benefits from the face-to-face method and technology mediation in blended learning could bring the solution to cope with such situation. The current research, then, was conducted, and contributed to the demand of national manpower development in science and technology in Thailand which requires graduates with both professional capabilities and proficient language skills to work for organisations and industries, including the potential of blended learning instruction to the university and instructors in terms of time and cost effectiveness, and guidance for initiating the course. As a specific contribution to a doctoral study, despite limits of generalisability, the study is illustrative in a way that blended learning instruction might be feasible in a particular case, and it is necessary to look at the natures of various types of learners and different aspects of language learning. In addition, the use of technology is likely to have positive perceptions and evidence for better improvement in language or vocabulary instruction. However, what is learnt from the study shows that technology cannot be only viewed as effective, but negativity may be the main concern about the feasibility of a blended learning approach because at some point it might not work or not be feasible with all students or at all tertiary institutions. As shown in the chart, feasibility of blended learning instruction stemmed from the current study suggest the key factors taken into account in creating the course, including the implications and recommendations which derive possible effects and suggestions in relation to practical and research aspects to vocabulary learning and teaching, support for vocabulary knowledge retention, potentiality of the use of blended learning for EFL learners, and the needs of further studies regarding the approach in educational or work settings. To conclude, this thesis has provided insights into the feasibility of a blended

learning approach from the various facets, in order to contribute to both practitioners and policy-makers to derive the utmost language learning outcomes and knowledge application in regard to academic and occupational purposes.

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Appendices

Appendix 1: Questionnaire

Perceptions and Attitudes towards Blended Learning for English Vocabulary Learning and Knowledge Retention

The purpose of this survey is to gather students' personal information, and perceptions and attitudes towards blended learning.

Section 1: Personal Information

1. Year of study: 1 2 3 4 Other: ____
2. Age: 17-20 21-24 over 25
3. Years of studying English: Less than 10 years 10-15 years
 More than 15 years
4. English courses taken: English 1 English 2
 Reading Writing
 English Conversation
 English for Work English Study Skills
 Others: _____
5. Computer knowledge: Good Average Poor
6. Experience with online courses: To a great extent Somewhat
 Very little Not at all
7. Experience with blended learning: To a great extent Somewhat
 Very little Not at all

Sections 2 – 5: Read the statements and select ONE of the rating scales regarding your opinion.

Sections	Items	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)
Section 2: Attitudes towards blended learning	1. I think I learned more in this blended learning (BL) environment.				
	2. I am more engaged with the course in this blended learning environment.				
	3. I would like more English courses to be organised in blended learning environment				
	4. I would recommend the blended learning course to friends or associates.				
	5. The blended learning course makes me more positive about learning English.				
	6. I prefer a more typical course without blended learning				
	7. Blended learning gives me more or better opportunities to communicate with the instructor.				
	8. Blended Learning gives me a chance to practice outside the classroom at my own pace.				
	9. Blended learning course could bring me more motivation in studying English.				
	10. I feel a greater sense of satisfaction and achievement when learning English in blended learning environment.				
Section 3: Perceptions towards blended learning	1. Blended learning courses are useful and interesting.				
	2. The blended learning course has improved my English vocabulary learning.				
	3. The blended learning course provides an appropriate balance between face-to-face and online learning.				

Sections	Items	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)
	4. Blended learning provides me additional materials to catch up with the course content.				
	5. It is easy to interact with friends or the teacher synchronously and asynchronously.				
	6. Blended learning provides flexibility for my learning (I can make my own decision of how much, when or where to learn).				
	7. In the blended learning environment, I have to be more self-disciplined in order to learn.				
	8. Teacher's feedback from blended learning course supports my vocabulary learning.				
	9. The collaboration through blended learning activities improves my learning.				
	10. Blended learning course helps increase the rate of my vocabulary knowledge retention.				
Section 4: Perceptions towards blended learning instruction during the course	1. The learning objectives are clearly stated in each blended learning lesson.				
	2. Blended Learning lessons are presented logically and clearly.				
	3. Tasks and activities are explained or instructed clearly.				
	4. The organisation of each lesson is easy to follow through.				
	5. The quizzes and materials enhance my vocabulary learning.				
	6. Practice or reviews in this blended learning course are effective to use in improving my learning.				
	7. I participate in giving peer feedback regularly.				
	8. I use peer feedback to improve my learning.				
	9. It is easy to work collaboratively with other students in a group project.				
	10. The use of technology (web-based content, educational platforms) is incorporated properly for this course.				
Section 5: Suggestions for blended learning course	1. There should be a training session for blended learning course before it starts.				
	2. The internet connection should be improved.				
	3. The proportion of online learning should be increased.				
	4. There should be more face-to-face interaction with teacher.				
	5. There should be more classroom practice.				
	6. There should be more after-class online practice.				
	7. There should be more communication with teacher outside the classroom.				
	8. It would be better to use students' own device than the facilities at the university.				
	9. The course content should be less difficult.				
	10. It would be better to watch a traditional teacher-led lesson than a lesson video.				

Other suggestions:

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Appendix 2: Interview questions

1. At the beginning of this semester, did you participate in the blended learning course introduction?
2. What kind of knowledge did you learn from this course?
3. Did you do all activities in the course?
4. Did you do all online assignments? Why or why not?
5. Which part of the instruction helps improve your vocabulary learning?
6. Does this blended learning course help you retain some vocabulary knowledge until the end of the course? Why/ How?
7. Do you normally do your vocabulary practice? Does it help retain your vocabulary knowledge you learned from the course?
8. What do you like most about this blended learning course?
9. What do you like least about this blended learning course?
10. Which part of the course is effective for your learning, classroom or online sessions?
11. What class modality do you like the blended learning course to be (e.g. Minimal use of the Web, mostly held in face-to-face format, an equal mix of face-to-face and web content, or extensive use of the Web, but still some face-to-face class time)?
12. Would you like to take more courses that use blended learning? Why or why not?
13. What suggestions or changes would you like to give to this blended learning course?

Appendix 3: Rubrics for independent teacher observation

Sessions	Criteria	4 Very good	3 Good	2 Satisfactory	1 Needs improvement	Comments
-	Lesson template	<ul style="list-style-type: none"> All components of lesson plan including learning objectives are clearly defined. Clear and accurate classroom interaction procedures Self-explanatory to a great extent 	<ul style="list-style-type: none"> Most components of lesson plan are clearly defined. Clear classroom interaction procedures Self-explanatory 	<ul style="list-style-type: none"> Some components of lesson plan need improvement. Classroom interaction procedures are given, but some parts are not clear. Self-explanatory to some extent 	<ul style="list-style-type: none"> Most components of lesson plan are not properly defined. Using inappropriate strategies or procedures Unclear explanation 	
Before-class	1) Online self-study lesson	<ul style="list-style-type: none"> Explicit learning objectives The content is relevant to the lesson for the in-class session. Very good use of materials and online tools Content is well-arranged and very easy for learners to follow through. 	<ul style="list-style-type: none"> Moderately clear learning objectives The content is somewhat relevant to the lesson for the in-class session. Good use of materials and online tools Content is arranged and mostly easy for learners to follow through. 	<ul style="list-style-type: none"> Learning objectives are self-explanatory, but needs a slight clarification. The content is partly relevant to the lesson for the in-class session. Fair use of materials and online tools Content is sometimes not easy for learners to follow through. 	<ul style="list-style-type: none"> Learning objectives are not clear. The content is not relevant to the lesson for the in-class session. Unable to make good use of materials and online tools It is difficult for learners to follow through the content. 	
Before-class	2) Assessment	<ul style="list-style-type: none"> Assessment tool accords with the learning objectives to evaluate learners' knowledge. 	<ul style="list-style-type: none"> Assessment tool accords with the learning objectives moderately to evaluate learners' knowledge. 	<ul style="list-style-type: none"> Assessment tool needs a slight improvement, so it can be used to evaluate learners' knowledge. 	<ul style="list-style-type: none"> Assessment tool is inappropriate to evaluate learners' knowledge. 	

Sessions	Criteria	4 Very good	3 Good	2 Satisfactory	1 Needs improvement	Comments
In-class	3) Introduction of the lesson	<ul style="list-style-type: none"> • Setting a conducive environment • Very interesting and most relevant introduction • Learning objectives and tentative activities are clearly informed at the beginning of each lesson 	<ul style="list-style-type: none"> • Setting a suitable environment • Interesting and relevant introduction • Learning objectives are informed before starting each lesson 	<ul style="list-style-type: none"> • Setting a satisfactory environment • Some parts of the introduction are irrelevant. • Learning objectives are informed, but not clear before starting each lesson. 	<ul style="list-style-type: none"> • Introduction to the lesson needs improvement. • Neither learning objectives nor activities are informed. 	
In-class	4) Development of the lesson	<ul style="list-style-type: none"> • Very well refreshing pre-existing knowledge needed for the lesson • Relating present learning with previous learning • Creating high interests among students throughout the class • Encouraging learners to initiate questions or participate during the instruction • Eliciting learners' responses to carry the lesson forward • Providing scaffolds in constructing knowledge when starting a new lesson • Creating situations for skill development • Accommodation to support different levels of learners 	<ul style="list-style-type: none"> • Refreshing the pre-existing knowledge needed for the lesson • Mostly relating present learning with previous learning • Creating moderate interests among learners throughout the class • Moderately encouraging learners to initiate questions or participate during the instruction. • Eliciting some learners' responses to carry the lesson forward • Providing scaffolds to some degree in constructing knowledge when beginning a new lesson • Using some situations to boost skill development • Moderate accommodation to support different levels of learners 	<ul style="list-style-type: none"> • Slightly refreshing the pre-existing knowledge needed for the lesson • Slightly relating present learning with previous learning • Creating some interests among learners throughout the class • Slightly encouraging learners to initiate questions or participate during the instruction • Eliciting a few learners' responses to carry the lesson forward • Providing some backgrounds when beginning a new lesson • Occasionally using situations for skill development • Offering some accommodation to support different levels of learners 	<ul style="list-style-type: none"> • No refreshing the pre-existing knowledge needed for the lesson • Not relating present learning with previous learning • Creating low interests among learners throughout the class • Not encouraging learners to initiate questions or participate during the instruction • No attempt to elicit learners' responses to carry the lesson forward • Starting a new lesson without scaffolds or backgrounds • Using no or irrelevant situations for skill development • Offering minimum accommodation to support different levels of learners 	
In-class	5) Learning activities	<ul style="list-style-type: none"> • All activities are relevant to learning objectives and content 	<ul style="list-style-type: none"> • Most activities are relevant to learning objectives and content. 	<ul style="list-style-type: none"> • Some activities are relevant to learning objectives and content. 	<ul style="list-style-type: none"> • Activities are not relevant to learning objectives and content. • Activities are not suitable for 	

Sessions	Criteria	4 Very good	3 Good	2 Satisfactory	1 Needs improvement	Comments
		<ul style="list-style-type: none"> Activities consider different levels of learners. The quantity of activities is provided within time limits and learners' capacity. Appropriate feedback is provided for learners. 	<ul style="list-style-type: none"> Activities are proper for almost of different levels of learners. The quantity of activities is moderately provided within time limits and learners' capacity. Appropriate feedback is somewhat provided. 	<ul style="list-style-type: none"> Activities are appropriate for a few different levels of learners. The proper quantity of activities is provided to some degree Feedback is provided to some degree. 	<ul style="list-style-type: none"> levels of learners. There are too many or few activities provided. Feedback is not provided. 	
In-class	6) Learner engagement	<ul style="list-style-type: none"> All learners are actively engaged in activities assigned in group or individually. All learners participate in the instructional process. 	<ul style="list-style-type: none"> Most learners are actively engaged in activities assigned in group or individually. Most learners participate in the instructional process. 	<ul style="list-style-type: none"> Several learners are required to be actively engaged in activities assigned in group or individually. Several learners do not participate in the instructional process. 	<ul style="list-style-type: none"> Most learners are not actively engaged in activities assigned in group or individually. Most learners do not participate in the instructional process. 	
In-class	7) Use of audio-visual aids & technology integration	<ul style="list-style-type: none"> Use of technology is fully integrated into the lesson. Students' learning is fully supported by the use of technology. Appropriate selection and use of audio-visual aids 	<ul style="list-style-type: none"> Use of technology is almost fully integrated into the lesson appropriately. Students' learning is mostly supported by technology used. Moderate selection and use of audio-visual aids 	<ul style="list-style-type: none"> Use of technology is partly integrated into the lesson. Students' learning is partially supported by technology used. Fair selection and use of audio-visual aids 	<ul style="list-style-type: none"> Technology is not integrated into the lesson. Students' learning is not supported appropriately by technology used. Inappropriate selection and use of audio-visual aids 	
In-class	8) Mastery of the subject matter	<ul style="list-style-type: none"> Very clear understanding of the objectives and content delivery Content, methods and supplementary materials can support deep vocabulary learning. 	<ul style="list-style-type: none"> Clear understanding of the objectives and content delivery Most content, methods and supplementary materials can support deep vocabulary learning. 	<ul style="list-style-type: none"> Fairly clear understanding of the objectives and content delivery Part of content, methods and supplementary materials can support deep vocabulary learning. 	<ul style="list-style-type: none"> Unclear understanding of the objectives and content delivery Content, methods and supplementary materials can lead to surface vocabulary learning. 	
In-class	9) Class management	<ul style="list-style-type: none"> Developing very good rapport with learners Learners are self-disciplined. Able to keep monitoring all learners at group or individual work 	<ul style="list-style-type: none"> Developing good rapport with learners Most learners are self-disciplined. Able to keep monitoring most learners at group or individual work 	<ul style="list-style-type: none"> Good rapport with learners is slightly developed. Teacher doesn't give much importance to discipline. Slightly able to keep monitoring learners at group or individual work 	<ul style="list-style-type: none"> Good rapport with learners does not occur. Learners are not disciplined at all. Unable to keep monitoring learners thoroughly at group or individual work 	

Sessions	Criteria	4 Very good	3 Good	2 Satisfactory	1 Needs improvement	Comments
		<ul style="list-style-type: none"> • Very systematic group or individual work 	<ul style="list-style-type: none"> • Systematic group or individual work 	<ul style="list-style-type: none"> • Some learners are restless during group or individual work. 	<ul style="list-style-type: none"> • Learners are forced to do group or individual work. 	
Wrap-up	10) Closure of the lesson	<ul style="list-style-type: none"> • The lesson is summarised very clearly based on each learning point. • Learners participated in content summary to a great extent. 	<ul style="list-style-type: none"> • The lesson is summarised fairly clear based on each learning point. • Learners participated in content summary. 	<ul style="list-style-type: none"> • A brief summary of some learning points is made. • Learners reflect slightly in making a summary. 	<ul style="list-style-type: none"> • No summary is made. • Learners are not encouraged to participate in the content summary. 	
Wrap-up	11) Assessment and evaluation	<ul style="list-style-type: none"> • A very clear relationship between learning objectives and assessment of learning • Able to make very good use of the assessment tool • Formative evaluation or the end-of-unit quiz is able to assess what is learnt. 	<ul style="list-style-type: none"> • A clear relationship between learning objectives and assessment of learning • Able to make good use of the assessment tool • Formative evaluation or the end-of-unit quiz can fairly assess what is learnt. 	<ul style="list-style-type: none"> • A slightly clear relationship between learning objectives and assessment of learning • A proper assessment tool is used to some degree. • Formative evaluation or the end-of-unit quiz can slightly assess what is learnt. 	<ul style="list-style-type: none"> • An unclear relationship between learning objectives and assessment of learning • An assessment tool is not used properly. • Formative evaluation is unable to assess what is learnt. 	

Appendix 4: Course content selected from the textbook (Clarke, 2014)

Units	Communication skills Students can:	Grammar	Vocabulary	Listening	Reading
Unit 1: Introductions	<ul style="list-style-type: none"> ask for personal information describe a company profile 	<ul style="list-style-type: none"> Present Simple Present Continuous 	<ul style="list-style-type: none"> Companies and the Internet Jobs Describing your work 	<ul style="list-style-type: none"> Introductions at a training course 	<ul style="list-style-type: none"> Article about a professional networking site
Unit 2: Work-life balance	<ul style="list-style-type: none"> talk about work routines discuss exercise and ways to relax 	<ul style="list-style-type: none"> Adverbs of frequency Time phrases 	<ul style="list-style-type: none"> Work and routines Phrasal verbs, <i>do</i> as an auxiliary 	<ul style="list-style-type: none"> Conversation about someone's new job 	<ul style="list-style-type: none"> Article about work-life balance Article about exercise and lifestyle
Unit 3: Telephone talk	<ul style="list-style-type: none"> use telephone phrases make an order by telephone 	<ul style="list-style-type: none"> Polite questions 	<ul style="list-style-type: none"> Numbers Telephone phrases Telephoning phrases 	<ul style="list-style-type: none"> Telephone numbers Requests for information and orders Telephone customer service 	<ul style="list-style-type: none"> Article about effective telephone communication
Unit 5: Internet histories	<ul style="list-style-type: none"> give a presentation about a company's history or an app ask questions about the past 	<ul style="list-style-type: none"> Past Simple Questions about past events 	<ul style="list-style-type: none"> Business and the Internet Phrases of talking about the past 	<ul style="list-style-type: none"> Documentaries about the history of the Internet 	<ul style="list-style-type: none"> Article about the birth of the Internet
Unit 6: Orders	<ul style="list-style-type: none"> give and receive details about an important order deal with problems and offer solutions 	<ul style="list-style-type: none"> <i>will</i> for unplanned decisions 	<ul style="list-style-type: none"> Business communication Phrases of dealing with correspondence 	<ul style="list-style-type: none"> Telephone conversations about an important order 	<ul style="list-style-type: none"> Article about grammar in business correspondence
Unit 7: Hotels	<ul style="list-style-type: none"> make comparisons make and respond to special requests 	<ul style="list-style-type: none"> Comparatives and superlatives 	<ul style="list-style-type: none"> Hotel services Travel and accommodation 	<ul style="list-style-type: none"> Conversation at airport check-in Conversation at hotel reception 	<ul style="list-style-type: none"> Posts on a forum about hotels Article about a hotel
Unit 9: Spirit of enterprise	<ul style="list-style-type: none"> exchange information about a company describe change in a country or 	<ul style="list-style-type: none"> Present Perfect 	<ul style="list-style-type: none"> Language to describe change Phrases of talking about business developments 	<ul style="list-style-type: none"> Radio programme about entrepreneurs Company profile: Inditex 	<ul style="list-style-type: none"> Articles about two successful companies

Units	Communication skills Students can:	Grammar	Vocabulary	Listening	Reading
	company				
Unit 10: Stressed to the limit	<ul style="list-style-type: none"> make suggestions to relieve stress compare different jobs 	<ul style="list-style-type: none"> <i>have to/ don't have to, should/ shouldn't</i> 	<ul style="list-style-type: none"> Stress at work Phrases of talking about stress 	<ul style="list-style-type: none"> People talking about stress at work 	<ul style="list-style-type: none"> Article about stress at work
Unit 11: Top jobs	<ul style="list-style-type: none"> talk about someone's experiences 	<ul style="list-style-type: none"> <i>Present perfect (unfinished past), for & since</i> 	<ul style="list-style-type: none"> Company news Describing a company's development 	<ul style="list-style-type: none"> Telephone call from a headhunter 	<ul style="list-style-type: none"> Article about a media executive
Unit 14: Hiring and firing	<ul style="list-style-type: none"> discuss when sacking is justified ask for clarification 	<ul style="list-style-type: none"> <i>Passive</i> 	<ul style="list-style-type: none"> Procedures Job interviews 	<ul style="list-style-type: none"> Talking about applying for a new job 	<ul style="list-style-type: none"> Article about someone being fired
Unit 15: Time	<ul style="list-style-type: none"> discuss time management talk about decisions and plans 	<ul style="list-style-type: none"> <i>going to & will</i> 	<ul style="list-style-type: none"> Time collocations, working conditions Phrases of talking about time 	<ul style="list-style-type: none"> A talk on time management 	<ul style="list-style-type: none"> Article about working without clocks
Unit 18: E-commerce	<ul style="list-style-type: none"> talk about advantages and disadvantages Make predictions 	<ul style="list-style-type: none"> <i>will for predictions</i> 	<ul style="list-style-type: none"> Shopping and the Internet Phrases of discussing advantages and disadvantages 	<ul style="list-style-type: none"> Radio interview about the pros and cons of e-commerce 	<ul style="list-style-type: none"> Survey about the future of the Internet
Unit 19: E-work	<ul style="list-style-type: none"> discuss the advantages and disadvantages of teleworking talk about hypothetical situations 	<ul style="list-style-type: none"> <i>Conditionals (future reference)</i> 	<ul style="list-style-type: none"> Teleworking Giving explanations 	<ul style="list-style-type: none"> People talking about telework 	<ul style="list-style-type: none"> Article about the rise of e-workers

Appendix 5: Course syllabus

**Department of Languages, Faculty of Applied Arts
King Mongkut's University of Technology North Bangkok**

Course Syllabus

- 1. Course Number** 080103020
- 2. Course Credit** 3 (3-0)
- 3. Course Title** English for Industrial Management
- 4. Semester** 1
- 5. Academic Year** 2018
- 6. Instructors** Paunluck P. Saengsawang & Folefac Tanya Nkenglefac
(Department of Languages, FAA)
- 7. Course Status** Required Course
- 8. Degree** Bachelor's Degree

9. Course Description:

Language skills in business and industrial management; planning, finance, production, marketing, and human resource management.

10. Course Objectives: After taking this course, students should be able to:

- 10.1 use technical English language in production, corporate, finance, HR, marketing, safety, career, business management, etc.;
- 10.2 participate in formal and informal conversations in a business context;
- 10.3 express ideas and practice writing on industrial management topics; and
- 10.4 give a basic oral presentation in a business context using appropriate visual aids.

11. Course Outline

Week	Date	Topic	Holidays
1	6 - 11 Aug.	Induction Week (proficiency test & vocabulary pre-test)	-
2	13 - 17 Aug.	Unit 1: Introductions	13 Aug. 'Thai Mother's Day' observed
3	20 - 24 Aug.	Unit 2: Work-life balance	-
4	27 - 31 Aug.	Unit 3: Telephone talk	-
5	3 - 7 Sept.	Unit 5: Internet histories	-
6	10 - 14 Sept.	Unit 6: Orders	-
7	17 - 21 Sept.	Unit 7: Hotels	-
8	24 - 28 Sept.	Unit 9: Spirit of enterprise	-
9	1 - 5 Oct.	Midterm Examination (Wednesday 3 rd October 2018, 13.00 - 16.00)	

Week	Date	Topic	Holidays
10	8 - 12 Oct.	Unit 10: Stressed to the limit	-
11	15 - 19 Oct.	Unit 11: Top jobs	15 Oct. 'Anniversary of the Death of King Bhumibhol' observed
12	22 - 26 Oct.	Unit 14: Hiring and firing	23 Oct. 'Chulalongkorn Day'
13	29 Oct. - 2 Nov.	Unit 15: Time	-
14	5 - 9 Nov.	Unit 18: E-commerce	-
15	12 - 16 Nov.	Unit 19: E-work	-
16	20 - 23 Nov.	Review	-
17	26 Nov. - 7 Dec.	Final Examination (Friday 30 th November 2018, 9.00 - 12.00)	

12. Class Materials

12.1 Main Material:

Clarke, S. (2014). In Company 3.0 (Pre-Intermediate) Student's book. Macmillan: London.

12.2 Supplementary Materials:

<http://www.macmillanincompany3.com/resources/teacher/resource-centre/pre-intermediate/>

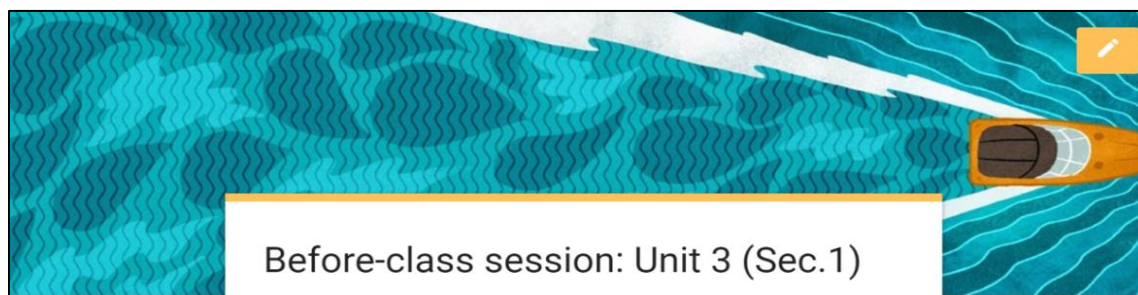
<http://www.macmillanincompany3.com/resources/student/resource-centre/pre-intermediate/>

12.3 Course Management Tools: Computer session, Bring-your-own-device (BYOD) session, Google Classroom, Group work blog, Facebook Group.

13. Evaluation Criteria

Criteria	Percentage	Notes
In-class session:		
- Attendance	5	Class absence is allowed for only 3 times per semester
- Participation	5	Individual & Group work
Assignments	5	Before-class session activities
End-of-unit quizzes	10	Administered as a formative assessment after each unit
Vocabulary post-tests (Post-test #1 & Post-test #2)	10	Administered during midterm and final exams
Midterm Exam	35	Contents from U.1, 2, 3, 5, 6, 7, 9
Final Exam	30	Contents from U. 10, 11, 14, 15, 18, 19

Appendix 6: Sample before-class assignment



Before-class session: Unit 3 (Sec.1)

* Required

Name: *

Your answer _____

ID: *

Your answer _____

โปรดระบุเวลาที่เริ่มทำ: *

Time

__ : __ AM ▾

Review: Polite Questions

In this unit, we are talking about how to change direct questions into polite or indirect questions, in order to make the questions sound more polite. Look at the picture below.

Direct -----> Indirect Questions


Grammar

Polite questions

Direct questions	Polite questions	Differences
Where are you from?	Can you tell me	where you are from?
How is she ?		how she is?
Where are we meeting?	Can you remember	where we're meeting?
Where do you live?	Could you tell me	where you live?
How much money does he earn?		how much money he earns?
Does he like football?	Do you know	if he likes football?
Has he got my address?		if he has got my address?

• Word order
 • if in Yes/No questions

Examples and explanations of how to change the direct questions into indirect or polite questions. Watch them from this video.



WWW.ESPRESSOENGLISH.NET

More examples

Direct questions	Indirect questions
What is he doing?	Do you know what he is doing?
Where can I sit?	Could you tell me where I can sit?
Where are you from?	I was wondering where you are from.
What is this?	Do you know what this is?
Do you like flying?	Could you tell me if you like flying?
What's your name?	Can I ask you what your name is?

Indirect Questions

- Here are some of **the most common phrases** used for asking indirect questions.

Do you know ... ?

Can/Could you tell me ... ?

Do you happen to know ... ?

I wonder / was wondering ...

I wonder if you'd mind telling me. . .

Would you mind telling me . . . ?

Can I ask . . . ?

May I ask you . . . ?

I'd like to know ...

Indirect Questions using wh-words

FORMULA:

⓪ **Introductory phrase** + ⓪ **question word** (*what, when, where, why, which...*) + ⓪ **subordinate clause** (positive sentence structure)

Direct question: *Where can I find El Prado Museum?*

Could you tell me where I can find El Prado Museum?

↓ ↓ ↓
Introductory question subordinate
phrase word clause

When using an indirect question, use an introductory phrase followed by the question itself in **positive sentence structure**.

Indirect Questions with yes/no questions

FORMULA:

⓪ **Introductory phrase** + ⓪ **if/whether** (*what, when, where, why, which...*) + ⓪ **subordinate clause** (positive sentence).

Direct question: *Are you travelling on business?*

Could you tell me if/whether you are travelling?

↓ ↓ ↓
Introductory if/whether subordinate
phrase clause

When using an indirect question, use an introductory phrase followed by the question itself in **positive sentence structure**.

Practice

A customer phones an airline for some information. Listen to the conversation and complete the actual questions you hear.



In the space provided, type in the actual questions you hear.

a. Do you know what _____ ? *

Your answer

b. Could you tell me _____ ? *

Your answer

c. Do you know if _____ ? *

Your answer

Change the direct questions into polite or indirect questions. Use the introductory phrases e.g. could you tell me, can you tell me, do you know or other phrases that you know.

a. What time does the meeting begin? *

Your answer

b. How much is the hotel? *

Your answer

c. Why is he angry? *

Your answer

d. Is there a restaurant car on the train? *

Your answer

e. Where can I park the car? *

Your answer

f. Is the office near the town centre? *

Your answer

After submission, you can check the suggested answers or answer feedback.

End of before-class session

SUBMIT

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Google Forms

Appendix 7: Sample lesson plan with PowerPoint Slides

06 Orders

What's the biggest mistake you've made at work?

A man who has committed a mistake and doesn't correct it is committing another mistake.
Confucius

Learning objectives:
1) To give and receive details about an important order
2) To deal with problems and offer solutions

Unit 6
Business communication skills
Giving and receiving details about an important order; Roleplay; Complaining about errors in an order; Discussing the importance of grammar.


conversations about an important order
Phrase bank Dealing with correspondence
Vocabulary Business communication
Grammar will for unplanned decisions

1

Learning objectives: 1) To give and receive details about an important order
2) To deal with problems and offer solutions

1 1.22 Listen to a telephone conversation about an order and answer the questions.

a Who does Elena Moretti want to speak to? **John Bird**
b What product does she want to order? **Hydraulic pumps**
c What is the reference number? **SG 94321**
d How many units does she want? **Five units**
e What is the delivery date? **22nd June**
f Why is this order particularly important? **It's for a new customer.**



2

Before-class session (online self-study):

- Listen to track 1.22
- Answer the questions in task 1 (p.37)
- Review "will" for unplanned decisions and complete the exercise.

Future Simple (Indefinite) Usage:

Promises	I promise I will buy you this toy.
Habits	He will always make noise when we are sleeping.
Unplanned (spontaneous) decisions	Don't worry! I will help you with this problem.
Predictions	It will get more difficult.

Unplanned events in the future simple:
will + infinitive

The will future form is normally used for an action or event in the future that **has not been previously arranged**. This may be because it has been **recently decided**, or it is a **response to new information**.

3

Before-class session (online self-study):

- Review "will" for unplanned decisions

Practice 1

When would you say the following sentences? Match the decisions (a-g) to the situations (1-7).

a I'll open the door for you.
b I'll take a taxi.
c I'll catch an earlier train.
d I'll lend it to you, if you like.
e I'll have a look on the Internet.
f I'll speak to the boss about it.
g I'll have another look at the figures.

g 1 A customer asks if you can give him a better discount.
c 2 Your boss asks you if you can start work before the usual time.
b 3 A colleague reminds you about a meeting with a client on the other side of town in ten minutes.
e 4 Someone asks you where you can get a new battery for a laptop computer.
a 5 A colleague is carrying a lot of files and documents and has both hands occupied.
f 6 Your wife/husband asks if you can take a day off work.
d 7 A colleague admires a new CD you are listening to.

p.43 **4**

Before-class session (online self-study):

- Complete *Practice 1* (p.43)

Grammar

will for unplanned decisions

You use *will* + infinitive to show you are making an on-the-spot or new decision.

Unplanned events in the future simple:
The will future form is normally used for an action or event in the future that **has not been previously arranged**. This may be because it has been **recently decided**, or it is a **response to new information**.

5

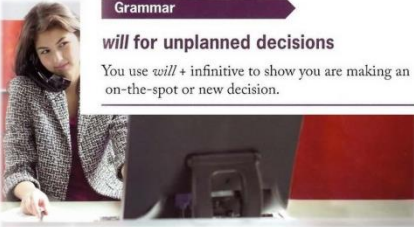
In-class session:

- Summarise *will* for unplanned decisions from before-class session

Grammar

will for unplanned decisions

You use *will* + infinitive to show you are making an on-the-spot or new decision.



6

In-class session:

- Summarise the contents from before-class session: the telephone conversation about an order
- **Lesson 6.1:** (To give and receive details about an important order)
- Introduction with a telephone conversation video in English.
- Ask students about what purpose a telephone conversation in business contexts is related to.

2 Work with a partner. Practise the conversation using the prompts.
A S-A-G / help? **Check out the audio script 1.22**
B Yes / speak / John Bird?
A afraid / not / office / now // can / message?
B Oh, dear! // urgent order / we / five hydraulic pumps / 22 June
A Just / minute // tell / name please?
B sorry // Elena Moretti / Stern Hydraulics / Switzerland
A Right / take down / details / get John / contact // say five units?
B Yes / reference / SG 94321
A SG 94321 / five units
B yes / right // important thing / delivery date / 22 June
A not think / a problem
B good / for / new customer
A I see // when John comes / tell him immediately // confirm / order / by email?
B yes / course / thanks / much
A you / welcome / goodbye
B goodbye
7

- In-class session:**
- Listen to track 1.22 again.
 - Write the full sentences from the conversation in task 2 (p.37)
 - Practice saying this conversation with students' partner.

3 Complete Elena Moretti's email confirming the order.

8

- In-class session:**
- Wrap up the conversation by completing task 3 (p.37).
 - Fill in the blanks with appropriate words from the conversation (track 1.22) in task 2.

6 Later, Elena received this email confirming her order. What is the mistake?

9

- In-class session:**
- Work in pairs.
 - Listen to track 1.24 and check what goes wrong with the piece of order confirmation in task 6.

Vocabulary

Business communication

1 Match the sentence beginnings (a-h) with the endings (1-8).

a There is a message ...	1 e. in writing last week.
b There is a mistake ...	2 h. in the letter you sent me.
c I asked him to phone ...	3 h. to your order.
d I sent you an email ...	4 d. about this problem last week.
e We confirmed the date of the meeting ...	5 c. back this afternoon.
f I will send you the packet ...	6 g. for what happened.
g I'd like to apologize ...	7 f. by courier this afternoon.
h We are giving top priority ...	8 a. from Dave Cartwright for you.

priority (n) something important that must be done first

10

- In-class session:**
- Practice more phrases on p.42.
 - Work in pairs.
 - Students make a conversation from the situation they receive.

A Systematic Approach for Making Decisions

1. Create a constructive environment.
2. Investigate the situation in detail.
3. Generate good alternatives.
4. Explore your options.
5. Select the best solution.
6. Evaluate your plan.
7. Communicate your decision, and take action.

11

- In-class session:**
- Lesson 6.2:** (To deal with problems and offer solutions)
- Introduction: students do an online quiz regarding decision-making skills at https://www.mindtools.com/pages/article/newTED_79.htm

happening immediately

On-the-spot decisions

1 1.25 Listen to the telephone conversation between David Holmbrook, the caller, and Jim Kutz, who answers the call. Answer the questions.

- Who does David want to speak to? **He wants to speak to Diego Martin.**
- Why? **Because he hasn't replied to his text message.**
- Why did David send a text message? **Because he needs a copy of a certificate for customs.**
- What solution does Jim offer?
- What is Jim's email address?

d. He will email him a copy of the certificate as a PDF file.
e. jim.jfa@cielosclone.net

certificate (n) an official document or record

12

- In-class session:**
- Give the definition of "on-the-spot"
 - Listen to the telephone conversation (track 1.25) and answer the questions in task 1 (p.41).

On-the-spot decisions

2 Some situations require on-the-spot decisions. What did the speakers in 1 say? Circle the correct answers.

I'll send you	a copy of the certificate.
I'm going to send	
I'm sending	
I'll deal	with the email straight away.
I'm going to deal	
I'm dealing	

You use *will* + infinitive to show that you are making an on-the-spot decision and to promise action.

13

In-class session:

- Identify *will* for unplanned decisions (p.41) in the business telephone conversation.

5 Work with a partner.

Speaker A: Look at the chart on page 141.

Speaker B: Choose a problem from the table and tell Speaker A. Begin *I've got a problem ...*

Speaker A will offer a solution and then tell you about a problem. React using one of the solutions below. Say *Don't worry, I'll ...*

A *I've got a problem, the battery in my mobile's flat.*

B *Don't worry, I'll lend you mine.*

Problems	Solutions
I've got a headache.	I'll look for information on the Internet.
We didn't get your text.	I'll send it to you again.
This report has lots of errors in it.	I'll go through it and correct them.
I can't remember his phone number.	I'll reserve the tickets for you this morning.
I haven't booked my flight to Berlin.	I'll look it up for you.
I need three copies of this proposal.	I'll print them out for you.
I don't know anything about this company.	I'll get you an aspirin.

Answers on page 146.

14

In-class session:

- Work with the partner.
- Practice identifying problems and offering solutions in task 5 (p.41).

Speaker A: p.141	Problems	Solutions
	I can't understand these figures.	I'll look for information on the Internet.
	My computer keeps crashing.	I'll send it to you again.
	I can't get an answer from the taxi service.	I'll go through it and correct them.
	I need to speak to you urgently.	I'll reserve the tickets for you this morning.
	The printer is not working properly.	I'll look it up for you.
	I don't know how to use this program.	I'll print them out for you.
	Our email system isn't working.	I'll get you an aspirin.

Problems	Speaker B: p.41	Solutions
I've got a headache.		I'll take you to the airport.
We didn't get your text.		I'll scan the details to you instead.
This report has lots of errors in it.		I'll show you how it works.
I can't remember his phone number.		I'll explain them to you.
I haven't booked my flight to Berlin.		I'll call the IT technician.
I need three copies of this proposal.		I'll phone you this afternoon.
I don't know anything about this company.		I'll change the ink cartridge.

15

In-class session:

- Work with the partner.
- Practice identifying problems and offering solutions in task 5 (p.41).

Vocabulary p.42

Business communication

1 Match the sentence beginnings (a-h) with the endings (1-8).

a There is a message ...	1 e. in writing last week.
b There is a mistake ...	2 h. in the letter you sent me.
c I asked him to phone ...	3 h. to your order.
d I sent you an email ...	4 d. about this problem last week.
e We confirmed the date of the meeting ...	5 c. back this afternoon.
f I will send you the packet ...	6 e. for what happened.
g I'd like to apologize ...	7 f. by courier this afternoon.
h We are giving top priority ...	8 a. from Dave Cartwright for you.

priority (n) something important that must be done first

16

In-class session:

- Practice more phrases on p.42.
- Work in pairs.
- Students make a conversation from the situation they receive.

3 Complete the crossword using the words in brackets as clues.

Across

- The **delivery** date for this order is 26th June. (when the order is supposed to arrive with the customer)
- It would be a **prompt** reply. ('quick' or 'fast')
- People see emails as an **informal** way of communicating. (the opposite of 'formal')
- I'm sorry, I can't read **handwriting**. (wrote it with a pen.)
- Machine used to send documents by telephone. **fax** (not a modem)
- We hope to do more **business** with them in the future. (buy or sell things or services)
- I need to look at the **correspondence**. (the noun of 'correspond')
- To make sure something is correct. **check**
- Sometimes it's difficult to make a **decision**. (the noun of 'decide')
- Could I leave a **message**, please? (what you leave when someone is not there)
- I'm really **annoyed**. (he hasn't phoned me. (irritated))
- Thank you. You're **welcome**.
- Could I take **down** the details? (the opposite of 'up')
- Could you **confirm** that you have received this bill? (the verb of 'confirmation')

Down

- Please do it **immediately**. (at once)
- The opposite of 'cheap' is **expensive**.
- The name written at the bottom of a document or email is a **signature**.
- Could you confirm the **details**, in writing, please? (bits of information)
- A service which picks up and delivers documents. (like UPS) **courier**
- I'd like to **apologise** for the mistake. (say sorry)
- I'm still waiting for a **reply** from John to my letter.
- Nowadays I use it for all my research and sending emails. **Internet**
- I'm very **worried** about this. (the adjective of 'worry')
- I'm **phoning** about the order. (calling)
- Error **mistake**
- 'Hello, is **that** John?' 'Yes, speaking.'
- Bad writing **skills** cost companies a lot of money. (abilities)
- I want to place an **order** for 300 units.
- Can you **send** it to me by email?
- How much will it **cost** us to send it?

Answers on page 138.

17

Wrap-up session:

- Review the vocabulary from lesson 6.1 and 6.2 in task 3 (p.42).
- Wrap up the language functions and vocabulary from the lessons.
- Students take an online quiz regarding the contents from the lessons.

Practice 2 p.43

What would you say in these situations? Reply using the word in brackets.

- Someone offers you something to drink. You can have tea or coffee. (coffee)
I'll have coffee, please.
- You are ordering a meal in a restaurant. You can have either soup or salad for a starter. (salad)
I'll have salad for a starter.
- You go out with some friends. You decide to pay for the drinks. (pay)
I'll pay for the drinks.
- A colleague is having problems with a new computer program you are familiar with. (help)
I'll help you with your computer program.
- Someone reminds you that you are taking a flight at 10.30 am. It is now 9 am. (taxi)
I'll take a taxi to the airport.
- A colleague has heard on the radio that the buses are on strike and now they can't get home. You have your car. (lift)
I'll give you a lift home.

18

In-class session:

- Practice more to identify solutions in *Practice 2* (p.43).
- Work in pairs.
- Write sentences to identify solutions to the situations.
- Share the answers to other students or the class.

Appendix 8: Test specifications

Part	B1 Preliminary English Test specifications (total 60 items)	
	Listening (25 items) In this listening test, students will listen to:	Reading (35 items) In the reading test, students will read:
1	a short recording and choose the correct picture.	texts and choose the correct choice of what each text says or tells.
2	an interview and choose the correct choice to each question.	descriptions of places and decide which one is the most suitable for each person
3	an announcement and fill in the missing information.	a text and decide if each statement is correct or incorrect.
4	a conversation and decide whether each sentence is correct or incorrect.	a text and choose the correct choice to each question.
5	-	a text (with missing words) and fill each blank with the correct word.

Vocabulary test specifications			
Units	Seven explicitly-taught words (Examples)	Three untaught words (Examples)	Total
1	retail, start-up, subsidiary	intrigue, coarseness	10
2	excessive, productive, strenuous	agility, unravel	10
3	engaged, reverse-charge call, vital	fringe, distinctive	10
5	addictive, distribution, merchandise	amenity, vilify	10
6	concerned, on-the-spot, take down	deploy, hectic	10
7	affordable, claustrophobic, short-hop	mutinous, expatriate	10
9	affiliated, entrepreneur, flagship	rampage, conservatory	10
10	constant, on edge, recuperate	aspiration, attribute	10
11	approach, recruit, component	supplant, tenement	10
14	dismiss, venture, recession	suppress, sophisticated	10
15	bottom line, intend, efficiency	harness, defiant	10
18	commit, drawback, tolerant	spellbound, discrimination	10
19	subsidize, obsolete, get down to	primitive, prospector	10
Total			130

Appendix 9: Sample paper of B1 Preliminary English Test (PET)



15 Dec, 14:45 GMT

Dear Paunluck Puntahachart Saengsawang,

Thank you for contacting us to request permission to use sample test materials for your PhD thesis.

This email confirms that Cambridge Assessment English grants you permission to use the B1 Preliminary sample paper for your thesis provided that you include the following acknowledgement and that you do not reproduce the test in full in your dissertation (you can include a sample task from the paper if necessary):

"This study uses the B1 Preliminary sample paper available from <http://www.cambridgeenglish.org/exams-and-tests/preliminary/preparation/> © UCLES 2015"

We wish you success in your studies.

Kind regards

Bea Kalman | Research and Thought Leadership
Cambridge English Language Assessment



Puntahachart

5 Dec, 13:10 GMT

[Quoted text hidden]

Attachment(s)

Cambridge PET_Letter for Permission_Paunluck.pdf

Cambridge PET_Letter from Supervisor.pdf

Find help and answers to FAQs online at our support websites:



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PRELIMINARY ENGLISH TEST

Listening

SAMPLE TEST 6

Time Approximately 35 minutes (including 6 minutes' transfer time)

INSTRUCTIONS TO CANDIDATES

Do not open this question paper until you are told to do so.

Write your name, centre number and candidate number on your answer sheet if they are not already there.

Listen to the instructions for each part of the paper carefully.

Answer all the questions.

While you are listening, write your answers on the question paper.

You will have 6 minutes at the end of the test to copy your answers onto the separate answer sheet. Use a pencil.

At the end of the test, hand in both this question paper and your answer sheet.

INFORMATION FOR CANDIDATES

There are four parts to the test.

Each question carries one mark.

You will hear each piece twice.

For each part of the test there will be time for you to look through the questions and time for you to check your answers.

*

500/2414/0

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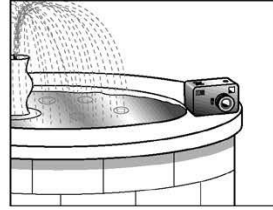
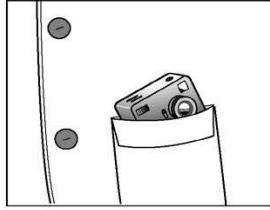
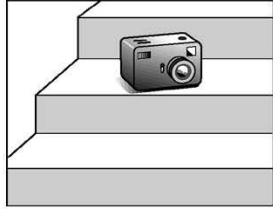
Cambridge English Entry Level Certificate in ESOL International (Entry 3)

Part 1

Questions 1 – 7

There are seven questions in this part.
For each question there are three pictures and a short recording.
Choose the correct picture and put a tick (✓) in the box below it.

Example: Where did the man leave his camera?

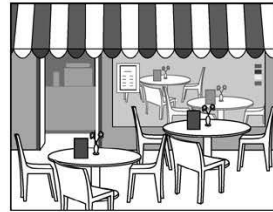
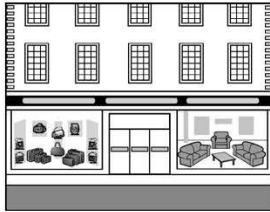
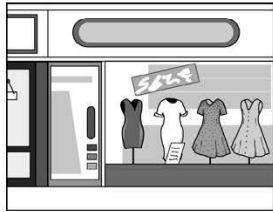


A

B

C

1 Where will the women meet tomorrow?



A

B

C

2 When will the man go to see the dentist?



A

B

C

Part 2

Questions 8 – 13

You will hear an interview with a writer called Peter Taylor.
For each question, put a tick (✓) in the correct box.

-
- 8 In Peter's first book, the story takes place in
- A a country which he's recently been to.
- B a country where he lived as a child.
- C the country where he was born.
- 9 When Peter first went to England, he visited his
- A grandfather.
- B uncle and aunt.
- C cousins.
- 10 Peter spends most of his year
- A near the beach.
- B in a city.
- C at his farm.
- 11 What problem did Peter have in the desert?
- A His vehicle broke down.
- B He didn't have enough water.
- C He was frightened by an animal.
- 12 In his spare time, Peter usually
- A goes to the cinema.
- B gets together with friends.
- C does photography.
- 13 What does Peter want to do in the future?
- A publish another novel
- B write a history book
- C spend more time travelling

Reading

Part 1

Questions 1 – 5

Look at the text in each question.

What does it say?

Mark the correct letter **A**, **B** or **C** on your answer sheet.

Example:

0



- A Andy would prefer to go sailing with Julia on Saturday rather than on Sunday.
- B Andy can go sailing with Julia on Friday if she's not free on Saturday.
- C Andy wants to go sailing with Julia on both Saturday and Sunday if possible.

Answer:

0	<input checked="" type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C
---	------------------------------------	-------------------------	-------------------------

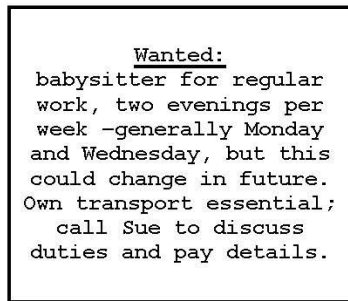
1



The note tells Sarah she

- A can buy new games now at a special price.
- B can get new and used games in the current sale.
- C can sell her used games to the shop.

2



The advertisement says

- A the babysitter should call Sue about weekly transport to her house.
- B the jobs the babysitter is responsible for will change each week.
- C the babysitter might work on different days each week.

2

Turn over ►

Part 2

Questions 6 – 10

The people below all enjoy music.

On the opposite page there are descriptions of eight places where people can have different musical experiences.

Decide which place would be the most suitable for the following people.

For questions 6 – 10, mark the correct letter (A – H) on your answer sheet.



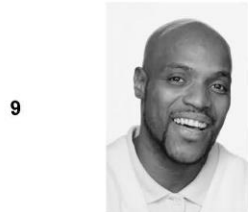
Joe's interested in classical music and wants to talk to professional musicians about their work. He'd like to find out more about classical instruments, and actually play some music.



Will wants to learn to play some of his favourite band's songs, and to know how his favourite singers create their own special sound. He'd like to try out some different instruments.



Jess loves watching spectacular concerts with fantastic dancers, and wants to feel some of the atmosphere of a big musical event. She'd like to see performances by famous people she's heard about.



James likes exploring the personal backgrounds of his favourite bands, and also the stories behind their well-known songs. He has his own band, and wants some advice about performing live on stage.



Zoe likes listening to all sorts of pop music, and wants a fun way to learn various dance styles. She'd like to bring something home to show her friends what she's learnt during her visit.

Appendix 10: Sample pages of vocabulary (pre-/post-/delayed) test



VOCABULARY PRE-TEST

Name: _____ ID No.: _____

Date: ____/____/____
DD MM YYYY

INFORMATION FOR CANDIDATES

- There are 130 items in this test.
- Each item contains four choices 1, 2, 3 and 4.
- Each item carries one mark.
- This test is a part of research fieldwork. Your score from this test will not affect your grade or study.

Time

Approximately 90 minutes

INSTRUCTIONS TO CANDIDATES

- Write your name and ID number on your answer sheet (Please see the example below).
- Use a pencil to blacken your answer on the answer sheet.
- At the end of the test, hand in both this question paper and your answer sheet.

ตัวอย่างการกรอกชื่อและเลขประจำตัวนักศึกษา

มหาวิทยาลัยเทคโนโลยีพระจอมเกล้าพระนครเหนือ

ชื่อ-นามสกุล นายขัยนย้ง ตั้งใจจริง

วันที่สอบ - วันที่สอบ 8 ม.ค. 61

สนามสอบ - ห้องสอบ -

โปรดอ่านวิธีการกรอกชื่อและเลขตัวอักษรในคำอธิบาย

กรอกรหัสนักศึกษา 13 หลัก
โดยเขียนเลขและระบายสีดำเรียงไปตามช่อง
ดังตัวอย่าง

เลขที่สมัคร	เลขที่นั่งสอบ	รหัสวิชา
6 0 1 2 3 4 - 5	6 - 7 8 9 1 2	

1 () () () ()	31 () () () ()	61 () () () ()	91 () () () ()	121 () () () ()
2 () () () ()	32 () () () ()	62 () () () ()	92 () () () ()	122 () () () ()
3 () () () ()	33 () () () ()	63 () () () ()	93 () () () ()	123 () () () ()
4 () () () ()	34 () () () ()	64 () () () ()	94 () () () ()	124 () () () ()
5 () () () ()	35 () () () ()	65 () () () ()	95 () () () ()	125 () () () ()
6 () () () ()	36 () () () ()	66 () () () ()	96 () () () ()	126 () () () ()
7 () () () ()	37 () () () ()	67 () () () ()	97 () () () ()	127 () () () ()
8 () () () ()	38 () () () ()	68 () () () ()	98 () () () ()	128 () () () ()
9 () () () ()	39 () () () ()	69 () () () ()	99 () () () ()	129 () () () ()
10 () () () ()	40 () () () ()	70 () () () ()	100 () () () ()	130 () () () ()
11 () () () ()	41 () () () ()	71 () () () ()	101 () () () ()	131 () () () ()
12 () () () ()	42 () () () ()	72 () () () ()	102 () () () ()	132 () () () ()
13 () () () ()	43 () () () ()	73 () () () ()	103 () () () ()	133 () () () ()
14 () () () ()	44 () () () ()	74 () () () ()	104 () () () ()	134 () () () ()
15 () () () ()	45 () () () ()	75 () () () ()	105 () () () ()	135 () () () ()
16 () () () ()	46 () () () ()	76 () () () ()	106 () () () ()	136 () () () ()
17 () () () ()	47 () () () ()	77 () () () ()	107 () () () ()	137 () () () ()
18 () () () ()	48 () () () ()	78 () () () ()	108 () () () ()	138 () () () ()
19 () () () ()	49 () () () ()	79 () () () ()	109 () () () ()	139 () () () ()
20 () () () ()	50 () () () ()	80 () () () ()	110 () () () ()	140 () () () ()
21 () () () ()	51 () () () ()	81 () () () ()	111 () () () ()	141 () () () ()
22 () () () ()	52 () () () ()	82 () () () ()	112 () () () ()	142 () () () ()
23 () () () ()	53 () () () ()	83 () () () ()	113 () () () ()	143 () () () ()
24 () () () ()	54 () () () ()	84 () () () ()	114 () () () ()	144 () () () ()
25 () () () ()	55 () () () ()	85 () () () ()	115 () () () ()	145 () () () ()
26 () () () ()	56 () () () ()	86 () () () ()	116 () () () ()	146 () () () ()
27 () () () ()	57 () () () ()	87 () () () ()	117 () () () ()	147 () () () ()
28 () () () ()	58 () () () ()	88 () () () ()	118 () () () ()	148 () () () ()
29 () () () ()	59 () () () ()	89 () () () ()	119 () () () ()	149 () () () ()
30 () () () ()	60 () () () ()	90 () () () ()	120 () () () ()	150 () () () ()

Instruction:

Choose the correct meaning of each word.

1. campaign
 1. the way in which something is put together or arranged
 2. a series of things designed to produce a particular result
 3. a piece of writing telling a story and being performed on a stage
 4. a particular series of numbers or letters used to open a lock
2. retail
 1. based on how much there is of something
 2. relating to the sale of goods directly to the public for their own use
 3. regarding duration or time length of a sound sequence
 4. relating to things that are sold in large amounts
3. competitor
 1. a person who ensures the tight security of an event
 2. someone who says or express opposite things
 3. one that grant the right to sell a company's goods
 4. a company that sells the same goods or services as another company
4. ethics
 1. a set of principles that represents what is right and what is wrong
 2. a law or fact of nature that explains how something works
 3. the degree to which something is right and good
 4. the fact or state of agreeing with or obeying something
5. founder
 1. a person who is right or needed
 2. an organizer of an event
 3. someone who sets up a company
 4. someone who acts what he means or says
6. start-up
 1. a high level of value or excellence
 2. a small business that is just being begun
 3. a series of related jobs that someone does
 4. a large meeting related to people's particular interests
7. subsidiary
 1. a special position presented by a governmental authority
 2. a duty or task that you are required to do
 3. a thing that is being dealt with in a particular way
 4. a company that is owned by a larger company

8. intrigue
 1. to make someone else feel relaxed or comfortable
 2. to get something that someone gives or send to another person
 3. to make someone want to know more about something
 4. to need someone or something in order to survive
9. coarseness
 1. computer programs used for teaching
 2. the quality of being rough or uneven
 3. a situation in which there are many different types of people
 4. a feeling of pleasure when one succeeds in doing something
10. inauguration
 1. the start or introduction of something new or important
 2. attention or care that is given to someone or something
 3. the fact that someone belongs to a group with the same culture
 4. an activity that happens regularly and has become the usual thing
11. absenteeism
 1. an effect that an object has on another object or on the senses
 2. the habit of not being at school or work without a good reason
 3. the fact of being visible or noticed in a particular place or area
 4. a provision making the effect of a legal instrument unlikely to happen
12. excessive
 1. behaving in a way that is morally correct
 2. relating to a special and unusual quality
 3. impossible to divide or separate
 4. much more than is reasonable or necessary
13. laze around
 1. to relax and enjoy oneself without doing work
 2. to come into the company
 3. to think of one person or thing
 4. to move toward something
14. maintain
 1. to restore to a sound or healthy state
 2. to provide something good against something bad
 3. to make something stay the same
 4. to supply something that is needed
15. moderate
 1. located far above the ground
 2. neither very great nor very small in amount, size, or degree
 3. relatively low in position or rank
 4. including examples of the different types of people or things
16. productive
 1. able to represent in words
 2. doing things suddenly without planning
 3. expressing a strong feeling
 4. working hard and getting good results

17. strenuous
1. showing great energy and effort to do an activity
 2. said or done in a forceful or definite way
 3. able to cause people to do or believe something
 4. having power to cause changes
18. unravel
1. to believe or imagine that something is true
 2. to have the qualities that are necessary
 3. to develop or move forward slowly
 4. to understand something that is difficult
19. agility
1. a situation in which life is very difficult
 2. a strong feeling to find out about something
 3. a feeling of respect for someone
 4. the ability to move quickly and easily
20. inconspicuous
1. impossible to stop from happening
 2. not easily seen or not attracting attention
 3. unpleasant or difficult to live in a situation
 4. having a strong effect on someone
21. directory enquiries
1. a division within a system of classification
 2. a systematic examination to learn how it happened
 3. a service used to find out someone's telephone number
 4. an act of finding out the fact about something
22. engaged
1. feeling concern about someone in a bad situation
 2. having qualities that people like
 3. relating to the opposing party in a disagreement
 4. being used or a part of something or a situation
23. reference number
1. a number that shows where to find information that someone needs
 2. a book that contains list of numbers of businesses or people
 3. a number used to identify the location of building written on letters
 4. a symbol showing an e-mail message or a site on the Internet
24. extension
1. a connection by which one thing is attached to another
 2. a extra telephone connected to the main line
 3. a process of taking control of something
 4. a more complete or detailed piece of work
25. reverse-charge call
1. a phone call made to the other receiver to make a banking request
 2. an international telephone call that speakers can see each other
 3. a telephone call that the person you are calling agrees to pay for
 4. an overseas call that someone can make from a hotel with free of charge

Appendix 11: Sample notes of independent teacher observation

Begin at 1.15 pm.

17 Engineering students

- Greet and tell the students that there are six students with sick leave.
- Tell the lesson objectives.
- Ask students the question relating to the learned vocabulary (sacking).
- Check students whether they did the exercises.
- Review Passive Voice which the teacher already asked students to do before the class. Then let them do exercises in class

Example: They haven't finished the new building. ----

- Do the exercise with the students. Try to give clues during doing it. Focus on specific point For example, no need to put an agent which isn't specific.

Note: During doing the exercise, the students paid attention.

- Sometimes the teacher tried to review what the students have learned before. Moreover, besides give correct answers the teacher translated some sentences.
- Reading passages for reviewing Passive Voice

From the news

1. Before reading the news, the teacher asked student questions (What did you do 17 years ago?) when pointing to the year on the news. Then let students read the title aloud.

Then ask students questions related to the news.

2. Tell the students some background about the word (IBIZA), Wales which is one of UK, BBC (confirming this new is true)

Try to let the students think if they can win a prize to Mediterranean, will they be happy or feel good?

Then let the students do the exercises (5 questions) related to the news.

During letting the students do exercises, the teacher told/asked students indirectly about their classmates who were absent. Guess some reasons (in a funny way).

The teacher walks around the class for checking whether the students do the exercise. Try to encourage them to do it. She also answers student's questions when they ask during doing the exercise. She tries to conclude reading techniques. Try to ask other easier questions (What is the company's name?)

Describe some words or phrases such as 'Totally over the moon', hang up, order, take part in etc.

Note: The teacher is friendly. Sometimes she tells her personal information such as childhood, her family, etc.).

She also explains synonym such as 'fire= sack/ lay off'.

During reading and translating the passage, the teacher also asked questions.

Asking students questions by specifying the student. For example, two students (male and female). Call the student's name. Although she calls the specific names, she tries to make feel relaxed and dare to give an answer.

Note: The teacher tries to give funny sample situations when she describes the reading passage.

- Ask the students do the survey about reasons for sacking online taking from Facebook group. The teacher explains the vocabulary's meanings such as dishonesty, revealing company secrets, violence, etc.

- Ask the students to do the exercise related to Passive Voice. The teacher helps by giving clues during doing the exercise.

- Ask the students to do more exercises about Passive Voice. The teacher explains business words such as recession, business ventures, estate. She told students to remember the main structure of Passive Voice.

- Teach about CV and a job advertisement. The teacher tries to remind the students about what they have already learned. Let the students listen the recording about a job interview and answer questions (p.89).

Before doing the exercise, the teacher explained some questions.

The teacher gives more questions about a job interview such as 'Do your present employers know where you are?', 'Is your Spanish as good as your English', 'How much managerial experience do you have?.'

Then the teacher describe about asking for more information/ clarifying some information such as 'Now, can we just check out some details?'

.....

Appendix 12: Sample notes of researcher observation

Week	Students' behaviour	
	Experimental group (classes 1, 3, 5)	Control group (class 2)
4 (Unit 3)	<ul style="list-style-type: none"> - Using Kahoot.it as a game to wrap up or review the vocabulary learnt at the end of lesson could get most students engaged in participation. - Students spent around 30 minutes on end-of-unit quiz - Approximately 90% of students were responsible for their before-class self-study assignment. 	<ul style="list-style-type: none"> - Reviewing the vocabulary learnt with a game allowed students to be attentive and engage in participation. - Approximately 60-70% of students were responsible for their assigned exercises which were required to be previewed before class. - Due to the large class size and the room setting, it caused some difficulties to walk through to monitor each group during activities or practice.
5 (Unit 5)	<ul style="list-style-type: none"> - Some lessons (e.g. company's history) were skipped and replaced by a conversation practice. - Approximately 90% of students were responsible for before-class self-study assignment. - Most students could use the past simple very well, while some of them were having difficulties in changing the correct form of the past simple verb. - Students divided into groups. Each group was assigned to post questions in the past simple form through the FB group where teacher could give immediate feedback or sticker responses. 	<ul style="list-style-type: none"> - Students divided into groups. They were assigned to make questions in the past simple form. They submitted their questions in the paper-based format. - Conversation practice with partner. Teacher walked around to monitor and give feedback. - Students seemed to get engaged in the assigned activity. - Students took the paper-based end-of-unit quiz after the lesson.
7 (Unit 7)	<ul style="list-style-type: none"> - A group did a good presentation to review the before-class self-study content to the whole class. - Students participated well (especially S.3) during a group activity. The activity (comparatives and superlatives) lasted about half an hour. - Teacher posted a doc file on the FB group. Students worked in groups to write a comparison between hotels/ accommodation to choose the most suitable one for their group. - They produced their work in a Word document and converted it to jpeg. Then it was posted on the FB group. - Students took the end-of-unit quiz on the Google platform after the lesson. 	<ul style="list-style-type: none"> - A group of student was assigned to review the exercise of 'comparatives and superlatives', that they studied before class, to the whole class. They prepared well and did a good presentation. - Teacher distributed activity worksheets. Students worked in groups to choose the best accommodation for their group. Each group wrote sentences to make comparisons on the assigned worksheet and they submitted it to the teacher at the end of lesson. - Students took the paper-based end-of-unit quiz after the lesson.

Appendix 13: Sample transcriptions of student interviews

Interview 1:

Interviewer = I, Student = S

I: Did you come to class on the first week?

S1: Yes, I did.

S2: Yes.

I: Have you ever been absent?

S1: I was absent once.

S2: Never.

I: What is this course called?

S1: English for Industrial Management

S2: English for Industrial Management

I: Can you tell what kind of vocabulary do we learn in this course?

S1: It's about work.

S2: I think it's vocabulary for work

I: Did you participate in all in-class activities?

S1: Yes, I did.

S2: I participated in every activity.

I: And did you pay attention while doing those activities?

S1: Often. And I was sometimes using the smartphone.

S2: Sometimes I didn't pay attention.

I: Did you take responsibility to undertake every before-class assignment?

S1: Yes, I did.

S2: I did almost of every assignment. But I'm not sure which one I omitted.
Maybe I didn't do one or two assignments.

I: Why?

S2: I forgot about it.

I: Will you go back to do them?

S2: I'm not sure.

I: When did you normally do the before-class assignments?

S1: Before the in-class session.

S2: I did them outside the classroom.

I: After taking this course, has your vocabulary bank or vocabulary size become increasing?

S1: Yes.

S2: Yes.

I: If so, can you retain the taught vocabulary from the beginning until the end of the course?

S1: I can retain a part of the taught words.

S2: I cannot retain many of them because I didn't review them very often.

I: How do you think about the assistance of end-of-unit quizzes in the vocabulary knowledge retention?

S1: I think they partly helped.

S2: I think so because it summarised or reviewed at the end of lesson.

I: After each class, did you review the taught vocabulary outside the classroom?
S1: No, I didn't.
S2: No, but only during the exam.
I: What affects your retention of the taught vocabulary?
S1: Regular use or lack of use of the vocabulary.
I: How about lack of regular vocabulary review?
S1: Yes, it takes some part of it. Without regular word review, I tend to forget those words.
S2: I agree. Likewise, we use Thai language to communicate every day, so we have opportunities to use vocabulary without reviewing. So, we tend to forget the English vocabulary because we don't use it very often.
I: After taking this course, are there any parts that you are satisfied or dissatisfied with?
S1: I like the environment (computer room) because we can watch the learning content on the personal computer screen. But I don't like when I had to type in the answers during the quizzes. I prefer the multiple-choice test because typing might cause me to be too exhausted.
S2: I also like the computer room facility which allows us to watch the content on an individual computer screen. But I want to suggest the improvement on the course content which is not necessary to rely on the textbook. For example, it might be good to watch a video of an authentic work situation which enables us to use the language in the real contexts. Sometimes, course books might be uninteresting.
I: Regarding the proportion of the blended learning course, can you suggest the percentage between face-to-face and online methods?
S1: I think 70 for face-to-face and 30 for online out-of-class assignments which are homework and exercises. In my opinion, students prefer a face-to-face communication or interaction in the classroom.
I: Do you mean every week or what?
S1: Yes, every week or in each week, within 3-hour class time, it might be divided into two hours for studying face-to-face, and another one hour for online study.
S2: I like the way we were studying in this course. If we are allowed to undertake online self-study on our own, we might not be successful with the independent learning. So, the online method should take some part in the course, but not the main approach.
I: Do you think you can study a subject online?
S2: I took one before, but, in my opinion, the self-study content should be easy to understand and fun because it will make learning more interesting.
I: Can you suggest the percentage between the two methods?
S2: 70 for in-class session and 30 for out-of-class online study
I: Do you think the blended learning is applicable into other academic courses, apart from language courses?
S1: I think it seems suitable. For example, learners can re-watch the in-class taught lessons outside the classroom. This way they can also review

because teachers might not provide sufficient time for them during class time.

S2: I think it can be used to adjust in those courses, especially when teachers can respond to students' queries online.

Interview 2:

Interviewer = I, Student = S

I: Did you come to class in the first week?

S3: Yes, I did.

S4: Yes.

I: Have you ever been absent during the course?

S3: Never

S4: Only once. But I was usually slightly late for class.

I: Were you attentive to the class?

S3: Yes.

S4: When the content was interesting, I would pay attention.

I: What is the name of this course?

S3: English for Industrial Management

S4: Is it English Study Skills?

I: What kind of knowledge have you got from this course?

S3: English for work in industries.

S4: Is it related to communication? English used in specific contexts of business or organisations.

I: Did you participate in every in-class activity?

S3: I joined and helped my classmates do the activities.

S4: For group work, I observed and helped the group members do the tasks.

I: Were you paying attention to while doing the activities?

S3: Of course. I was paying attention in every activity.

S4: Yes, with my friends.

I: Did you take responsibility in the assigned before-class self-study?

S3: I did every assignment. It's perfect.

S4: Yes, I did every assignment.

I: When did you undertake the assignment?

S4: On weekends or before the Monday class.

I: After the course, how do you think about the increase in your vocabulary bank or vocabulary size?

S3: I think it has been somewhat increasing.

S4: Yes, it has increased.

I: If so, to what extent can you retain the taught vocabulary knowledge from the beginning until the end of the course?

S3: I can retain the taught words that I often see or use, or words that I've seen from the tests.

I: How about 'productive' which you've learnt recently?

S3: I don't remember.

I: How about some words or phrases, e.g. premises, crack the whip, which were taught before the midterm exam?

S3: I can't recall.

I: How about you?

S4: It seems that I can't retain all taught words. The words that I can retain are those which are often used.

I: How about the words that were taught before midterm, e.g. premises, crack the whip?

S4: I can't recall the meaning. I must go back to check out from the book.

I: Therefore, what affects your vocabulary knowledge retention?

S3: Lack of use. And I normally review the vocabulary before the exams.

S4: I think it probably depends on an individual learner. Some students might not pay much attention to what is being taught at that moment. Or sometimes they learn vocabulary, but it might be forgotten at the end of the class due to lack of use with the taught words.

I: Did you review the taught vocabulary?

S4: I reviewed it for the exams.

I: How do think about that assistance of end-of-unit quizzes in retaining your vocabulary knowledge?

S3: I think they partly help and interest me to memorise the taught words.

S4: They will help if the taught words are of my interests. Sometimes I was distracted by talking to my friends during the instruction, so I forgot those words and the quizzes may not help.

S3: I think it also depends on individuals to retain vocabulary knowledge by using or practicing.

I: After this course, are there any parts that you feel satisfied and dissatisfied?

S3: I like it when we could look at what we were learning on the personal computer screen.

S4: What I like is we could watch the content on the personal computer screen, instead of looking at the whiteboard. I also like the online quizzes that we don't have to type much, but I prefer to have more multiple-choices because they will probably help me to recall more of the taught words. What I may not like is that the content seems to be irrelevant to my background as the content is more related to business and I'm not sure if I will have a chance to use business-related language knowledge.

S3: I agree that the content is irrelevant to my background. It's difficult for me.

I: In terms of proportion of the blended learning course, can you suggest the percentage between face-to-face and online methods?

S3: I believe that 100 for face-to-face instruction, without the online method, is better as I will probably gain more of what is taught.

S4: Personally, when you put the summary and vocabulary reviews on the Facebook group, it is working well for me. It is advantageous when everything is done in the classroom.

I: How about the proportion of the online instruction?

S4: I think studying in the in-class session is better than independent online study.

I: Do you think you can control yourself for the online study?

S4: Of course not. Sometimes if I have questions, it will be difficult to study online on my own.

I: So, can you suggest the certain proportion?

S4: 100 for face-to-face and put summary of the taught content online. It would be good if, after reading the summary, we have a chance to ask questions in the classroom. The online summary can also be put live as we can ask concurrently, and it seems similar to face-to-face communication. I think it's important to interact with the teacher.

I: Do you think the blended learning is applicable into other academic courses, apart from language courses?

S3: There should not be the online method. The in-class instruction is better, especially the calculus subject.

I: How about you being able to re-watch the teaching video online?

S3: It might be okay if the review was presented online. But for the new content, face-to-face instruction is more useful.

S4: Personally, online study might not be useful for students to learn independently. If it's a compulsory subject, students might do it to pass for the test or for grades. They might not study because they are really interested in it. They lack self-discipline to control their online learning. So, in my opinion, the online method is not useful.

Appendix 14: Ethics approval



Shaped by the past, creating the future

29/06/18

Paunluck Puntahachart-Saengsa
Email paunluck.puntahachart-saengsa@durham.ac.uk

Dear Paunluck,

The Use of Blended Learning to Support Vocabulary Learning and Knowledge Retention in Thai Tertiary EFL Classroom

Reference : 3164

I am pleased to inform you that your ethics application for the above research project has been approved by the School of Education Ethics Committee.

May we take this opportunity to wish you good luck with your research.

Yours sincerely,

A handwritten signature in black ink that reads "Nadin Beckmann". The signature is written in a cursive style.

Dr Nadin Beckmann
School of Education Ethics Committee Chair

Leazes Road
Durham, DH1 1TA
Telephone +44 (0)191 334 2000 Fax +44 (0)191 334 8311
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Appendix 15: Participant's consent form



Shaped by the past, creating the future

APPENDIX C

Declaration of Informed Consent

- I agree to participate in this study, the purpose of which is to examine students' vocabulary learning through the support of a blended learning approach within an EFL classroom setting at King Mongkut's University of Technology North Bangkok, Thailand.
- I have read the participant information sheet and understand the information provided.
- I have been informed that I may decline to participate and answer any questions or withdraw from the study without penalty of any kind.
- I have been informed that data collection may involve the use of recording devices (video and audio recording on iPad and smartphone).
- I have been informed that all of my responses will be kept confidential and secure, and that I will not be identified in any report or other publication resulting from this research.
- I have been informed that the investigator will answer any questions regarding the study and its procedures. Mrs. Paunluck Puntahachart Saengsawang, School of Education, Durham University can be contacted via email: paunluck.puntahachart-saengsa@durham.ac.uk or telephone: +44 7783839010, +66 892356292
- I will be provided with a copy of this form for my own records.

Any concerns about this study should be addressed to the School of Education Ethics Sub-Committee, Durham University via email to ed.ethics@durham.ac.uk.

Date	Participant Name (please print)	Participant Signature
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I certify that I have presented the above information to the participant and secured his or her consent.

Date	Signature of Investigator
------	---------------------------

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Durham University is the trading name of the University of Durham

Appendix 16: Summary of findings related to RQ1

Tests	Statistics	Statistical Output		Results
		Intervention (N = 103)	Control (N = 43)	
PET	Mean	24.12	29.40	<ul style="list-style-type: none"> - Statistically significant difference in PET scores between the two groups - The control group's PET scores were higher than the other group. - Control group's English language proficiency was greater than the experimental group.
	S.D.	7.11	9.06	
	Test of normality	$D(146) = .937, p < .001$		
	Independent - samples <i>t</i> -test	$t(144) = 3.760, p < .001, d = -0.68$		
	Mann-Whitney U test	$U = 1490.0, p = .002, r = -0.26$		
Pre-test	Mean	42.61	47.42	<ul style="list-style-type: none"> - Statistically significant difference in pre-test between the two groups - The control group's pre-test scores were greater than the other group. - The control group's vocabulary knowledge at the beginning was higher than the experimental group.
	S.D.	13.72	12.48	
	Test of normality	$D(146) = .914, p < .001$		
	Independent - samples <i>t</i> -test	$t(144) = 1.980, p = .049, d = -0.35$		
	Mann-Whitney U test	$U = 1580.5, p = .006, r = -0.23$		
Post-test	Mean	63.91	81.95	<ul style="list-style-type: none"> - Statistically significant difference in post-test between the two groups - The control group's post-test scores were greater than the other group. - After learning, the control group probably did better at post-test.
	S.D.	18.13	16.74	
	Test of normality	$D(146) = .967, p = .001$		
	Independent - samples <i>t</i> -test	$t(144) = 5.603, p < .001, d = -1.02$		
	ANCOVA	$F(1,143) = 28.387, p < .001, \eta p^2 = .166$		
Mann-Whitney U test	$U = 1007, p < .001, r = -0.43.$			
Gain scores: pre-post	Mean	21.30	34.53	<ul style="list-style-type: none"> - Statistically significant difference in gain scores (pre-post) between the two groups - The control group had higher gain scores (pre-post), and tended to have greater change than the experimental group during the course.
	S.D.	22.75	16.01	
	Independent - samples <i>t</i> -test	$t(144) = 3.469, p < .001, d = -0.63$		

Appendix 17: Summary of findings related to RQ2

Tests	Statistics	Statistical Output		Results
		Intervention (N = 34)	Control (N = 33)	
Pre-test	Mean	42.61	47.42	<ul style="list-style-type: none"> - Statistically significant difference in pre-test between the two groups - The control group's pre-test scores were greater than the other group. - The control group's vocabulary knowledge at the beginning was greater than the experimental group.
	S.D.	13.72	12.48	
	Test of normality	$D(146) = .914, p < .001$		
	Independent-samples <i>t</i> -test	$t(144) = 1.980, p = .049, d = -0.35$		
	Mann-Whitney U test	$U = 1580.5, p = .006, r = -0.23$		
Delayed test	Mean	54.29	67.42	<ul style="list-style-type: none"> - No statistically significant difference in delayed test between the two groups - Both groups tended to retain their vocabulary knowledge at an approximate level.
	S.D.	20.69	19.01	
	Test of normality	$D(67) = .964, p = .052$		
	Independent-samples <i>t</i> -test	$t(65) = 2.703, p = .009, d = -0.66$		
	ANCOVA	$F(1,64) = 1.216, p = .274, \eta^2 = .019$		
	Reliability test	$r = .232$		
Gain scores: pre-delayed	Mean	14.32	19.36	<ul style="list-style-type: none"> - No statistically significant difference in gain scores (pre-delay) between the two groups - During the course, students from both groups tended to retain their vocabulary knowledge at a similar rate.
	S.D.	15.58	16.98	
	Independent - samples <i>t</i> -test	$t(65) = 1.27, p = .210, d = -0.31$		
Gain scores: post-delayed	Mean	-20.79	-14.97	<ul style="list-style-type: none"> - No statistically significant difference in gain scores (post-delayed) between the two groups - After the course ended, the subjects' vocabulary knowledge retention tended to decrease at a similar level. The control group tended to retain the vocabulary greater than the other group.
	S.D.	13.15	14.29	
	Independent - samples <i>t</i> -test	$t(65) = 1.74, p = .087, d = -0.42$		

Appendix 18: Summary of findings related to RQ3

Tests	Statistics	Statistical Output				Results
		Intervention		Control		
		Male (N = 53)	Female (N = 50)	Male (N = 28)	Female (N = 15)	
PET	Mean	21.43	26.96	28.07	31.87	Intervention: - Statistically significant difference in PET scores between the two genders Control: - No significant difference in PET scores between the two genders
	S.D.	5.48	7.58	9.72	7.36	
	Test of normality	$D(103) = .938, p < .001$		$D(43) = .933, p = .014$		
	Independent - samples <i>t</i> -test	$t(101) = 4.26, p < .001, d = -0.84$		$t(41) = 1.321, p = .160, d = -0.42$		
	Mann-Whitney U test	$U = 734, p < .001, r = -0.38$		$U = 152.5, p = .142, r = -0.22$		
Pre-test	Mean	37.49	48.04	42.75	56.13	Intervention: - Statistically significant difference in pre-test scores between the two genders Control: - Statistically significant difference in pre-test scores between the two genders - Male and female students from both groups had different vocabulary knowledge at the beginning of the course.
	S.D.	8.52	16.01	10.53	11.34	
	Test of normality	$D(103) = .864, p < .001$		$D(43) = .963, p = .172$		
	Independent - samples <i>t</i> -test	$t(101) = 4.21, p < .001, d = -0.83$		$t(41) = 3.87, p < .001, d = -1.24$		
	Mann-Whitney U test	$U = 744.5, p < .001, r = -0.38$		-		
Post-test	Mean	56.62	71.64	78.07	89.20	Intervention: - Statistically significant difference in post-test scores between the two genders - Female students performed better. Control: - No significant difference in post-test scores between the
	S.D.	15.38	17.73	18.52	9.64	
	Test of normality	$D(103) = .981, p = .158$		$D(43) = .889, p = .001$		
	Independent - samples <i>t</i> -test	$t(101) = 4.59, p < .001, d = -0.91$		$t(41) = 2.167, p = .013, d = -0.69$		
	ANCOVA	$F(1,100) = 25.65, p < .001, \eta^2 = .204$		$F(1,40) = .656, p = .423, \eta^2 = .016$		

Tests	Statistics	Statistical Output				Results
		Intervention		Control		
		Male (N = 53)	Female (N = 50)	Male (N = 28)	Female (N = 15)	
	Mann-Whitney U test	-		$U = 132, p = .047, r = -0.3$		<p>two genders.</p> <ul style="list-style-type: none"> - Male and female students could perform in the test at an approximate level.
Delayed test	Mean	42.50	71.14	63.05	75.08	<p>Intervention:</p> <ul style="list-style-type: none"> - Statistically significant difference in delayed test scores between the two genders - Female students outperformed male students in the delayed test, tended to retain greater vocabulary knowledge. <p>Control:</p> <ul style="list-style-type: none"> - No significant difference in delayed test scores between the two genders - Both genders tended to retain vocabulary knowledge at a similar level.
	S.D.	13.24	17.63	20.94	12.37	
	Test of normality	$D(34) = .91, p = .009$		$D(33) = .976, p = .675$		
	Independent - samples <i>t</i> -test	$t(32) = 5.42, p < .001, d = -1.89$		$t(31) = 1.811, p = .046, d = -0.66$		
	Mann-Whitney U test	$U = 27, p < .001, r = -1.64$		$U = 74, p = .053, r = -0.34$		
	ANCOVA	$F(1,31) = 15.01, p = .001, \eta^2 = .33$		$F(1,30) = .462, p = .502, \eta^2 = .015$		
Gain scores: pre-post	Mean	19.13	23.60	35.32	33.07	<p>Intervention:</p> <ul style="list-style-type: none"> - No statistically significant difference in gain scores (pre-post) between the two genders - They might gain the change in vocabulary knowledge at a similar level. <p>Control:</p> <ul style="list-style-type: none"> - No significant difference in gain scores (pre-post) between the two genders - They probably had the change in vocabulary knowledge at a similar level.
	S.D.	18.62	26.45	16.89	14.66	
	Independent - samples <i>t</i> -test	$t(101) = .996, p = .322, d = -0.20$		$t(41) = .436, p = .665, d = 0.14$		

Tests	Statistics	Statistical Output				Results
		Intervention		Control		
		Male (N = 53)	Female (N = 50)	Male (N = 28)	Female (N = 15)	
Gain scores: pre-delayed	Mean	6.45	25.57	18.95	20.08	<p>Intervention:</p> <ul style="list-style-type: none"> - Statistically significant difference in gain scores (pre-delayed) between the two genders - Female students could retain greater vocabulary knowledge than male students during the course <p>Control:</p> <ul style="list-style-type: none"> - No significant difference in gain scores (pre-delayed) between the two genders <p>Both genders tended to retain their vocabulary knowledge, during the course, at an approximate level.</p>
	S.D.	12.23	12.88	18.53	14.61	
	Independent - samples <i>t</i> -test	$t(32) = 4.39, p < .001, d = -1.53$		$t(31) = .181, p = .857, d = -0.07$		
Gain scores: post-delayed	Mean	-23.50	-16.93	-15.90	-13.33	<p>Intervention:</p> <ul style="list-style-type: none"> - No statistically significant difference in gain scores (post-delayed) between the two genders <p>Control:</p> <ul style="list-style-type: none"> - No significant difference in gain scores (post-delayed) between the two genders - Both genders from both groups tended to retain their vocabulary knowledge at a similar level after the course ended. - Female students from both groups tended to retain greater vocabulary knowledge than male students
	S.D.	12.68	13.29	16.09	10.87	
	Independent - samples <i>t</i> -test	$t(32) = 1.46, p = .154, d = -0.51$		$t(31) = .491, p = .627, d = -0.18$		

Appendix 19: Summary of findings related to RQ4

Tests	Statistics	Statistical Output		Results
		Engineering (N = 56)	Architecture (N = 47)	
PET	Mean	23.96	24.30	<ul style="list-style-type: none"> - No statistically significant difference in English language proficiency between the two majors - Both majors tended to have a similar level of the language proficiency.
	S.D.	7.39	6.85	
	Test of normality	$D(103) = .938, p < .001$		
	Independent -samples <i>t</i> -test	$t(101) = .236, p = .814, d = -0.05$		
	Mann-Whitney U test	$U = 1301.5, p = .923, r = -0.009$		
Pre-test	Mean	39.38	46.47	<ul style="list-style-type: none"> - No statistically significant difference in pre-test between the two majors. - They had a similar level of vocabulary knowledge at the beginning of the course.
	S.D.	8.51	17.39	
	Test of normality	$D(103) = .864, p < .001$		
	Independent -samples <i>t</i> -test	$t(101) = 2.69, p = .013, d = -0.53$		
	Mann-Whitney U test	$U = 1072, p = .106, r = -0.16$		
Post-test	Mean	68.95	57.91	<ul style="list-style-type: none"> - Statistically significant difference in post-test between the two majors - Engineering students outperformed architecture students in post-test.
	S.D.	17.53	17.14	
	Test of normality	$D(103) = .981, p = .158$		
	Independent -samples <i>t</i> -test	$t(101) = 3.214, p = .002, d = 0.64$		
	ANCOVA	$F(1,100) = 11.004, p = .001, \eta p^2 = .099$		
Gain scores: pre-post	Mean	29.57	11.45	<ul style="list-style-type: none"> - Statistically significant difference in post-test between the two majors - From pre-test to post-test, engineering students' vocabulary knowledge tended to have more change than architecture students'.
	S.D.	16.27	25.48	
	Independent -samples <i>t</i> -test	$t(101) = 4.369, p < .001, d = 0.86$		

Appendix 20: Summary of findings related to RQ5

Tests	Statistics	Statistical Output				Results
		Class 1 (N=31)	Class 2 (N=43)	Class 3 (N=25)	Class 5 (N=47)	
PET	Mean	21.55	29.40	26.96	24.30	<ul style="list-style-type: none"> - Statistically significant difference in English language proficiency between the classes - Class 1 had lower language proficiency, comparing to classes 2 and 3. - Comparing to class 2, class 5 had a significant difference in language proficiency - Classes 2 and 3 had a similar level of language proficiency, which higher than classes 1 and 5. - Class 1 tended to have the lowest language proficiency level.
	S.D.	5.29	9.06	8.55	6.85	
	Test of normality	$D(146) = .937, p < .001$				
	One-way ANOVA	$F(3,142) = 5.33, p = .002$ Post hoc test: <ul style="list-style-type: none"> - class 1 \neq 2 ($p < .001, d = -1.02$) - class 5 \neq 2 ($p = .011, d = -0.64$) 				
Pre-test	Kruskal-Wallis H test	$\chi^2(3) = 17.74, p < .001$ Pairwise: <ul style="list-style-type: none"> - class 1 \neq 2 ($p < .001$) - class 1 \neq 3 ($p = .010$) - class 5 \neq 2 ($p = .009$) 				
	Mean	36.23	47.42	43.28	46.47	<ul style="list-style-type: none"> - Statistically significant difference in pre-test between the classes - Class 1 had a significant difference in pre-test, comparing to classes 2 and 5. - Class 1 tended to have the lowest level of vocabulary knowledge at the beginning of the course.
	S.D.	5.69	12.48	9.85	17.39	
Test of normality	$D(146) = .914, p < .001$					

Tests	Statistics	Statistical Output				Results
		Class 1 (N=31)	Class 2 (N=43)	Class 3 (N=25)	Class 5 (N=47)	
	One-way ANOVA	$F(3,142) = 5.33, p = .002$ Post hoc test: - class 1 \neq 2 ($p = .002, d = -1.09$) - class 1 \neq 5 ($p = .005, d = -0.73$)				
	Kruskal-Wallis H test	$\chi^2(3) = 17.74, p < .001$ Pairwise: - class 1 \neq 2 ($p < .001$) - class 1 \neq 5 ($p = .017$)				
Post-test	Mean	59.55	81.95	80.60	57.91	<ul style="list-style-type: none"> - Statistically significant difference in post-test between the classes - Classes 1 and 5 had a significant difference in post-test scores, comparing to classes 2 and 3 - Classes 2 and 3 outperformed classes 1 and 5 in vocabulary learning and knowledge. - Regarding the experimental group, class 3 outperformed the two other classes, 1 and 5.
	S.D.	12.61	16.74	15.81	17.14	
	Test of normality	$D(146) = .975, p = .010$				
	One-way ANOVA	$F(3,142) = 25.10, p < .001$ Post hoc test: - class 1 \neq 2 ($p < .001, d = -1.48$) - class 1 \neq 3 ($p < .001, d = -1.49$) - class 5 \neq 2 ($p < .001, d = -1.36$) - class 5 \neq 3 ($p < .001, d = -1.42$)				
	ANCOVA	$F(3,141) = 24.05, p < .001,$ $\eta^2 = .338$ Pairwise: - class 1 \neq 2 ($p < .001$) - class 1 \neq 3 ($p < .001$)				

Tests	Statistics	Statistical Output				Results	
		Class 1 (N=31)	Class 2 (N=43)	Class 3 (N=25)	Class 5 (N=47)		
		<ul style="list-style-type: none"> - class 5 ≠ 2 ($p < .001$) - class 5 ≠ 3 ($p < .001$) 					
	Kruskal-Wallis H test	$\chi^2(3) = 51.47, p < .001$ Pairwise: <ul style="list-style-type: none"> - class 1 ≠ 2 ($p < .001$) - class 1 ≠ 3 ($p < .001$) - class 5 ≠ 2 ($p < .001$) - class 5 ≠ 3 ($p < .001$) 					
Delayed test	Mean	38	67.42	70.59	-	<ul style="list-style-type: none"> - Statistically significant difference in delayed test between the three classes - Class 1 had a significant difference in delayed test scores, comparing to classes 2 and 3. - Classes 2 and 3 outperformed class 1 in vocabulary knowledge retention. - Based on the mean delayed test scores, class 3 tended to outperform the other classes. 	
	S.D.	6.56	19.01	16.61	-		
	Test of normality	$D(67) = .964, p = .052$					-
	One-way ANOVA	$F(2,64) = 22.89, p < .001$ Post hoc test: <ul style="list-style-type: none"> - class 1 ≠ 2 ($p < .001, d = -1.84$) - sec.1 ≠ 3 ($p < .001, d = -2.58$) 					-
	ANCOVA	$F(2,63) = 15.61, p < .001,$ $\eta^2 = .331$ Pairwise: <ul style="list-style-type: none"> - class 1 ≠ 2 ($p < .001$) 					-

Tests	Statistics	Statistical Output				Results
		Class 1 (N=31)	Class 2 (N=43)	Class 3 (N=25)	Class 5 (N=47)	
		- class 1 ≠ 3 ($p < .001$)				
	Kruskal-Wallis H test	$\chi^2(2) = 30.98, p < .001$ Pairwise: - class 1 ≠ 2 ($p < .001$) - class 1 ≠ 3 ($p < .001$)				-
Gain scores: pre-post	Mean	23.32	34.53	37.32	11.45	<ul style="list-style-type: none"> - Statistically significant difference in gain score (pre-post) between the classes - Classes 2 and 3 had greater change in vocabulary knowledge than class 5. - Class 3 had greater change in vocabulary knowledge than class 1. - Regarding the experimental group, class 3 outperformed classes 1 and 5 in terms of greater change of vocabulary knowledge from the beginning until one month after the course ended.
	S.D.	13.58	16.01	16.22	25.48	
	One-way ANOVA	$F(3,142) = 14.81, p < .001$ Post hoc test: - class 1 ≠ 3 ($p = .045, d = -0.95$) - class 5 ≠ 2 ($p < .001, d = -1.07$) - class 5 ≠ 3 ($p < .001, d = -1.14$)				
Gain scores: pre-delayed	Mean	1.88	19.36	26.76	-	<ul style="list-style-type: none"> - Statistically significant difference in gain scores (pre-delayed) between the three classes - Classes 2 and 3 outperformed class 1 in terms of greater change in retaining their vocabulary knowledge from the beginning of the course until one month after the course ended. - Based on the mean gain scores (pre-delayed), class 3
	S.D.	5.99	16.78	11.66	-	
	One-way ANOVA	$F(2,64) = 15.20, p < .001$ Post hoc test: - class 1 ≠ 2 ($p < .001,$				

Tests	Statistics	Statistical Output				Results
		Class 1 (N=31)	Class 2 (N=43)	Class 3 (N=25)	Class 5 (N=47)	
		$d = -1.22$ - class 1 \neq 3 ($p < .001$, $d = -2.68$)				had greater change than classes 1 and 2 in retaining their vocabulary knowledge from the beginning of the course until one month after the course ended.
Gain scores: post-delayed	Mean	-24.53	-14.97	-17.06	-	<ul style="list-style-type: none"> - No statistically significant difference in gain scores (post-delayed) between the three classes - All sections were likely to have a similar rate of vocabulary knowledge retention - Classes 1 and 3 were likely to gain relatively approximate change towards their vocabulary knowledge retention one month after the course ended. - Based on the mean gain scores (post-delayed), class 2 (control group) had greater change than classes 1 and 3 in retaining their vocabulary knowledge one month after the course ended.
	S.D.	12.46	14.29	13.11	-	
	One-way ANOVA	$F(2,64) = 2.84, p = .066$ Post hoc test: - class 1 \neq 2 ($p = .064$, $d = -0.69$) - class 1 \neq 3 ($p = .339$, $d = -0.58$)			-	

Appendix 21: Summary of findings related to RQ6

Tests	Statistics	Statistical Output & Results
		All participants (N = 146)
PET	Mean	25.67
	S.D.	8.08
Pre-test	Mean	44.03
	S.D.	13.50
Post-test	Mean	69.23
	S.D.	19.51
Delayed test	Mean	60.76
	S.D.	20.81
Pearson's r:		
1. PET - Pre-test		$r(146) = .51, p < .001$ - Language proficiency was positively correlated with pre-existing vocabulary knowledge at a high level. - When language proficiency increased, pre-existing vocabulary knowledge was increasing as well.
2. PET - Post-test		$r(146) = .45, p < .001$ - Language proficiency was positively correlated with increasing vocabulary knowledge at a medium level. - Language proficiency increased, but vocabulary knowledge may be somewhat increasing.
3. PET - Delayed test		$r(67) = .61, p < .001$ - Language proficiency was positively correlated with vocabulary knowledge retention at a high level. - As language proficiency increased, learners might be able to retain more of their vocabulary knowledge.
4. Pre-test - Post-test		$r(146) = .17, p = .045$ - Pre-existing vocabulary knowledge was positively correlated with increasing vocabulary knowledge at a small level. - With an increasing level of pre-existing vocabulary knowledge, vocabulary knowledge might slightly increase.
5. Pre-test - Delayed test		$r(67) = .62, p < .001$ - Pre-existing vocabulary knowledge was positively correlated with vocabulary knowledge retention at a high level. - Higher pre-existing vocabulary knowledge was more likely to influence learners to retain more vocabulary.
6. Post-test - Delayed test		$r(67) = .74, p < .001$ - Increasing vocabulary knowledge was positively correlated with vocabulary knowledge retention at a high level. - When vocabulary knowledge increased, it could be retained at a higher level.