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透過智慧型手機軟體探索成人英語聽力之單字習得

An Exploratory Study of Adult English Learners' Vocabulary Acquisition through Smartphone-based Listening Practice

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中文摘要

在英語教學研究領域，過去關於英語單字學習的研究中，大部分的研究都是關於學習者在閱讀中的單字習得，只有一部分的研究是在探討學習者從聽力中習得單字。其中，更少有研究探討學習者從學術演講中的單字習得。再者，透過行動裝置語言學習探討無意間單字習得的研究仍然相當貧乏。雖然有些研究指出，學習者可以透過學術演講無意間習得單字，但是關於學習者是否能從行動裝置學習的活動中無意間習得單字，以及他們在這之中所使用的聽力理解策略仍須進一步探討。本研究的目的在檢視學習者是否能利用智慧型手機裡的應用軟體 TED App，從觀賞 TED Talks 的學術小型演講中無意間習得單字。在進行這個行動裝置語言學習的活動中，學習者在此活動所使用的後設認知型聽力理解策略跟認知型聽力理解策略也被探討。此外，這個研究還探討受試者的無意間單字習得與他們使用聽力理解策略之間的關係。最後，本研究也探討學習者對於此行動裝置語言學習活動的態度。

總共有 35 位以英語為外語的成人學習者參加此研究，所有受測者都居住在北台灣。為了提供學習者真實的語料，本研究從 TED Talks 中選取三個小型演講。在一個月內，受試者完成單字的前測及後測，還有一個透過智慧型手機的語言學習

活動，此活動包括一週的智慧型手機自我學習跟一個線上問卷。實驗結束後，研究者根據線上問卷的回應訪談其中的 15 位學習者，以取得深入的質性分析資訊。

研究結果顯示，學習者在這個透過智慧型手機的語言學習活動中，無意間單字習得有顯著的進步。同時，結果顯示低成就的學習者可以透過觀看 TED Talks，無意間習得較多的單字。至於聽力策略使用方面，相較於後設認知型聽力策略，大部分的受試者使用認知型聽力策略的次數較頻繁。在 11 個認知型聽力策略中，其中 imagery 策略最受到歡迎。此外，其中 directed attention 跟 strategy evaluation 這兩個後設認知型策略跟受試者無意間的單字習得有顯著的關係。從整體看來，受試者對於透過智慧型手機的語言學習活動持正面的態度。

總結而言，透過智慧型手機的語言學習有助於 EFL 學習者無意間單字的習得。由 TED Talks 所提供的小型演講有利於學習者獲得知識及學習英語。此行動裝置語言學習活動同時也替學習者，創造出一個既休閒又不具壓力的學習環境。在未來，透過智慧型手機進行語言學習的方式與策略要被進一步研究，以作為延伸語言學習的參考。

關鍵字: 無意間單字習得、聽力理解策略、行動裝置輔助語言學習、智慧型手機應用程式

ABSTRACT

In the field of English learning and teaching, most studies have focused on vocabulary acquisition from reading. Only a few studies have been carried out on vocabulary acquisition from listening. Research on vocabulary acquisition from academic lectures has received even less attention. Furthermore, there are a limited number of studies on incidental vocabulary acquisition via Mobile-Assisted Language Learning (MALL). Though some studies have suggested that learners could acquire vocabulary incidentally from academic lectures, it is still unclear whether incidental vocabulary occurs and what listening comprehension strategy would be used in the MALL activity.

This current study examined whether learners would acquire vocabulary incidentally from academic mini-lectures through TED Talks on TED app. While engaged in the MALL activity, learners' metacognitive and cognitive listening comprehension strategies have been investigated. In addition, this study explored the correlation between learners' incidental vocabulary acquisition and their listening strategy use. Learners' attitudes toward this MALL activity were also explored.

A total of 35 adult learners of English as a Foreign Language in northern Taiwan participated in the study. Three mini-lectures were selected from TED Talks as authentic language input. Within one month, the participants completed a pretest, a posttest on vocabulary, and a MALL activity. This included a one-week independent learning with smartphones and an online questionnaire. After the experiment, the researcher interviewed 15 of the participants for further information about their responses on the online questionnaire.

The results of the study suggest that incidental vocabulary acquisition occurred with statistical significance in this MALL activity. They also indicate that lower-level learners could acquire more vocabulary from viewing TED Talks. As for the listening strategy use, most of the participants used cognitive listening strategies more frequently than metacognitive listening strategies. Among the 11 cognitive listening strategies, participants revealed that they preferred to use imagery strategy the most. Moreover, it was found that there was a statistically significant relationship between two metacognitive listening strategies, directed attention and strategy evaluation, and participants' incidental vocabulary gains. In general, participants had a positive attitude toward this MALL activity.

To conclude, EFL learners' incidental vocabulary acquisition is enhanced through smartphone-based language learning. The mini-lectures offered by TED Talks are considered to be beneficial for obtaining knowledge and learning English. This MALL activity also created a casual and stress-free learning environment for learners. Smartphone-based language learning could be promoted for extending learning in the future, and more studies are needed in learning and teaching strategies.

Keywords: Incidental Vocabulary Acquisition, Listening Comprehension Strategy, Mobile-Assisted Language Learning, Smartphone Application

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The development of technology has changed people's lives and learning behaviors. With the help of advanced technology, learners can easily retrieve information from different countries and gain a lot of practice to strengthen their language skills such as listening, speaking, reading, and writing through the Internet. As Computer-Assisted Language Learning (CALL) and Mobile-Assisted Language Learning, or M-learning (MALL), have become popular issues, more and more research has been conducted to explore their effectiveness and applications in educational environments.

CALL is a term that appeared in the early 1960s (Beatty, 2003), and its origins lay in audio-lingual methods (Balance, 2012). In recent years, CALL has been used widely in the field of language learning and has been especially promoted for English as Foreign Language (EFL) learners, since they have limited input in the learning environment (Hsu, 2013).

Nowadays, learners can not only use CALL in language labs but also can continue learning outside the traditional learning setting with the Internet. Therefore, recent studies related to CALL have been done on learner autonomy and distance learning, and learners were led to accomplish communicative tasks. Further, in recent decades, MALL has been

addressed in the field of CALL as a potential area for future study (Godwin-Jones, 2008, 2011). With regard to flexibility, MALL is likely to exceed CALL (Balance, 2012).

Most mobile learning activities found in the literature on the topic were teacher-led; few studies have been conducted to investigate how students do self-directed learning with mobile devices. Moreover, few studies have been conducted to investigate how students use mobile devices to learn in non-English courses (Song & Fox, 2008).

1.2 Statement of the Problem

When it comes to language learning, little research has been done on second language (L2) listening (Vandergrift, 2007), and studies carried out on incidental vocabulary acquisition are few in number (Zeeland & Schmitt, 2013). Based on recent research, these studies measured how much vocabulary learners gain through listening directly, and the results showed that the gains through listening are smaller than those through reading (Vidal, 2011). However, Zeeland and Schmitt (2013) suggest that these studies only assess learners' vocabulary knowledge of meaning; in other words, those tests were just meaning-based, which implies that more contextualized vocabulary assessments are needed.

As noted by Vidal (2011), very few studies have been conducted in incidental vocabulary acquisition from listening to academic lectures, and most of the research on vocabulary acquisition has been carried out in the field of reading (Bramki & Williams, 1994; Paribakht & Wesche, 1997; Parry, 1991, 1993; Pigada & Schmitt, 2006;

Zimmerman, 1997) instead of listening. Chaudron (1995) also observed that research on the acquisition or retention of vocabulary remains limited.

Furthermore, some studies (Vidal, 2003, 2011; Smidt & Hegelheimer, 2004; Yang, 2011) have been conducted to investigate the potential of authentic academic lectures for L2 vocabulary acquisition, but little is known about learners' learning behaviors when watching lectures through mobile phones. The potential of mobile-assisted language learning applied in authentic academic lectures has yet to be discovered. Therefore, the present study aimed to examine EFL adult learners' incidental vocabulary acquisition and listening comprehension strategy using TED Talks.

1.3 Purpose of the Study

The goals of this study were to investigate (1) learners' incidental vocabulary acquisition through academic mini-lectures, (2) the listening comprehension strategies that EFL adult learners used when watching academic mini-lectures, (3) the correlation between EFL adult learners' incidental vocabulary acquisition and their listening comprehension strategy use through academic mini-lectures, and (4) learners' attitudes and perceptions toward the MALL activity.

1.4 Research Questions

The specific research questions are as follows:

1. Do EFL adult learners acquire vocabulary through academic mini-lectures with their smartphones incidentally?

2. What listening comprehension strategies do EFL adult learners employ while watching academic mini-lectures via smartphones?

3. What is the relationship between EFL adult learners' incidental vocabulary acquisition and their listening comprehension strategy use through academic mini-lectures?

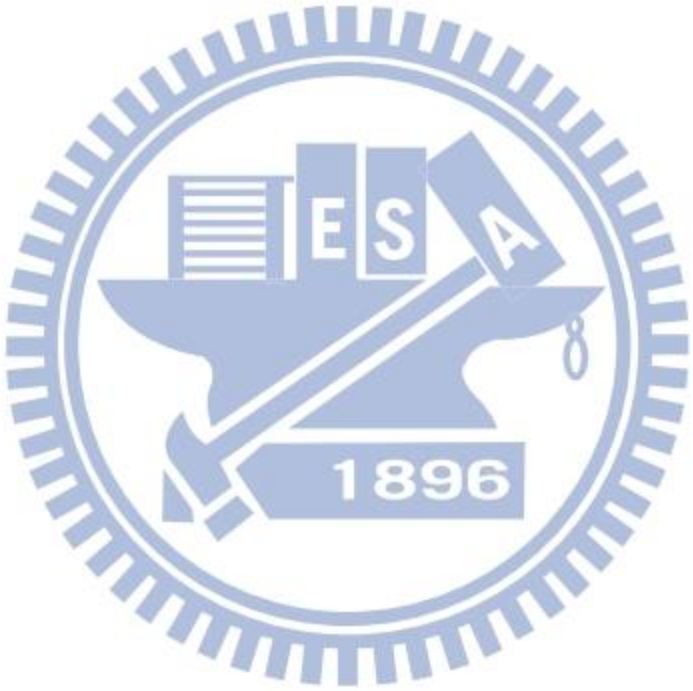
4. What are EFL adult learners' attitudes toward the MALL activity?

1.5 Significance of the Study

Research into the lecture comprehension from authentic lectures is valuable in both applied linguistics and language learning. How learners comprehend lectures could suggest techniques or strategies for teachers and learners when watching lectures on smartphones in the future. As for lecturers, the feedback from the audience may guide them to present their lectures in more comprehensible ways.

Furthermore, the results of this study could be beneficial to educators, technology-based language program designers, and language learning software developers, since it provides information on language learners' attitudes toward using a smartphone app for vocabulary learning. Through the questionnaire and interview, the results also reveal the advantages and disadvantages of mobile learning in informal settings. Therefore, educators could gain a more complete understanding of learners' needs and the activities

designed for learners might be made more suitable. As for language program designers and software developers, they could design and develop mobile language learning apps that are based on learners' need. In addition, the results can also contribute to the current body of literature on smartphone apps for language learning. Results of this study may also suggest a broader hypothesis for further research into the effectiveness of vocabulary acquisition from listening via smartphones.



CHAPTER TWO

LITERATURE REVIEW

The purpose of this chapter is to provide an overview of the research which has been done in the field of MALL, academic listening comprehension, and vocabulary acquisition.

2.1 Mobile Assisted Language Learning (MALL)

2.1.1 Definition

Mobile learning refers to learning with mobile or wireless devices, including cell phones, smartphones, laptops, personal media players, and any other mobile device (Kukulska-Hulme & Traxler, 2005). Moreover, Walker (2006) states that mobile learning is not just about using portable devices, but also refers to learning across different contexts. Mobile learning is supposed to be "mediated learning through mobile technology" (p. 9). In order to support education, more and more mobile devices have been invented to "ultimately support a lifetime of personal and social enrichment" (Roschelle, Sharples & Chan, 2005, p. 161).

2.1.2 The Development of Mobile-Assisted Language Learning (MALL)

As more and more people can afford mobile phones, portable and wireless devices are becoming increasingly popular and play an important role in changing the way people learn in the mobile-assisted learning environment. With the advent of these technologies, some related strategic educational goals are set such as lasting student's retention and

getting good grades, meeting learners' different learning needs, and providing for those who do not have the opportunity to learn (Kukulska-Hulme et al., 2005).

As Pea and Maldonado (2006) argue, handheld devices have seven features that make learners able to learn no matter the setting they are in. These features include "portability, small screen size, computing power (immediate starting-up), diverse communication networks, a broad range of applications, data synchronization across computers, and stylus input device" (p. 428). Among these seven features, portability is mentioned by Klopfer and Squire (2008) as the most distinctive one, which makes handheld devices different from other technologies and also enhances the chances of individual and interactive learning.

Chinnery (2006) mentions "Internet access, voice-messaging, Short Message Service [SMS] text-messaging, cameras, and even video-recording" (p.10) as common features of cell phones which could enhance language learning with authentic materials and communicative method. Moreover, Kukulska-Hulme and Traxler (2007) mention that being personalized, situated, authentic, spontaneous and informal are some important attributes of mobile learning. Besides, another innovative and engaging feature of mobile devices is the action of annotation, which allows students to learn in "book-marking areas of interest and creating context annotations that can trigger and support follow-up learning" (p. 26). In this case, mobile learning could help educators get to know their students' "preferences, needs and motivation" (Kukulska-Hulme, 2009, p. 158).

Although there are many merits to these technologies, there are some disadvantages. To investigate the effectiveness of mobile language learning, Chinnery (2006) reviewed

several studies on both mobile phones and Personal Digital Assistants (PDAs) and found some technological problems. The limitations are "small, low-resolution screens (problematic for image/video or even good text reading), poor audio quality (both in phoning and audio playback), awkward text entry, limited storage/memory and slow Internet connectivity" (Godwin-Jones, 2011, p. 2). Most of these limitations are also noted in other studies.

Despite these technological problems, Godwin-Jones (2011) argue that these current difficulties could be more or less solved with recently developed mobile technologies such as the iPhone, Android devices, Windows Phone 7 products, and especially the Apple iPhone, which came out in 2007. With a "responsive touch screen, a relatively large virtual keyboard or a full physical mini-keyboard, video capture, video editing, video recognition, faster 3G or 4G cellular connectivity and WiFi, and large build-in storage " (Godwin-Jones, 2011, p. 3), almost all smartphones can provide more functions for educational use than traditional cell phones — any time and any place.

2.1.3 Studies on Mobile-Assisted Language Learning (MALL)

With the development of MALL devices, learners have many choices when engaged in mobile learning, no matter what languages they are interested to learn. With the enhancement of the iPhone, software is gradually being developed. Among the apps that can be downloaded from the Apple Store, Mobile Safari is one of the significant apps created after iPhone appeared in 2007, since it allows browsers to access the full display of Web. Moreover, the introduction of the iPod in 2010 led to the development of more complicated apps. For example, a language learning app called Hello-Hello is quite

popular at one time (Godwin-Jones, 2011). Godwin-Jones (2011) stated that MALL activities are supposed to be integrated with apps and utilize the merits of mobile devices, such as the touch screen feature.

Mobile devices can be a convenient tool for mobile app learning in the context of informal language learning. Pierroux's MyArtSpace study serves as an example. Children were encouraged to post photos, audio recordings, and notes on a website via Mobile Safari for further discussion with other classmates after visiting a museum (Sharples et al., 2007). Another example is the Gidder project (Pierroux, 2008), in which students selected artwork they were interested in from wiki artworks through Mobile Safari before visiting a museum. While in the museum, they used their mobile phones to post multimedia messages with some notes on a blog.

Kukukska-Hulme and Shield (2008) report that most mobile learning studies have not taken advantage of the more advanced features of mobile devices such as mobility; instead, most of them have been "teacher-led and scheduled, not leveraging the anytime, anyplace mobile environment" (p. 7). In most cases, it seems that mobile devices are taken as material delivery tools and learners have not had much freedom to choose and manage their own learning. Few examples of learner-led mobile language learning projects have been found (Kukulska-Hulme, 2009).

A student-centered learning study done by Song and Fox (2008) was reported using "an open-ended, student-oriented approach." The project described students' vocabulary learning behaviors with PDAs to facilitate incidental vocabulary learning. Taking advantages of the portability of mobile devices, three undergraduate students from an

English as a Medium of Instruction (EMI) university in Hong Kong improved their vocabulary with various uses of PDAs. The results also show that the students successfully used the PDAs and the computer in vocabulary learning activities in an innovative and flexible way, which implies that mobile devices such as PDAs can be used for EFL vocabulary teaching and learning in higher education.

2.1.4 Studies on Vocabulary Learning via Mobile Phones

Among several mobile learning projects, Brown (2001) mentions one of them as the first study using mobile phones in language learning, which was carried out in the Stanford Learning Lab for Spanish learning (also cited in Chinnery's (2006) study). The results show that mobile phones can be effective tools when used for delivering quizzes and watching vocabulary voice lessons. However, Thornton and Houser (2002) state that learners are restricted by the tiny screens of mobile phones when learning new content, and mobile phones can only be used effectively "for review and practice" (p. 236).

In addition, Thornton and Houser (2002; 2003; 2005) conducted research by using mobile phones for English learning in Japan. Participants were divided into three groups and delivered vocabulary instruction by SMS, the Web, and paper, respectively. Since students received the vocabulary lessons in discrete segments, which can be easily seen even on tiny screens, most of them preferred having mobile phones as effective language learning tools. As the results indicate, the number of SMS students reviewing the materials was twice the number of those who received their lessons via the Web, and the SMS students' scores were almost two times higher than students learning on paper.

A study conducted by Zhang, Song, and Burston (2011) got similar results. In their study, 78 College sophomores from China were divided into two groups: the SMS group (the experiment group) and the paper group (the control group). There was a significant difference between these two groups in their vocabulary posttests, but a significant difference was not found in their delayed posttests. Although the researchers made the conclusion that two approaches were effective for learners' vocabulary learning, vocabulary learning via SMS was more effective for longer retention than providing learners a list of vocabulary through paper. Despite the significant results, some technological problems were mentioned by participants. One of the disadvantages was that participants often felt they were being interrupted and distracted because the researcher would send SMS messages with five words twice a day for 26 days. Another disadvantage reported was that this kind of learning approach hindered learners from reviewing previously learned vocabulary items since it was hard for them to find specific ones from dozens of uncategorized SMS messages.

One recent study related to mobile English vocabulary learning was conducted by Sandberg, Maris, and Geus (2011). Three classes of fifth grade students who were learning English as a second language participated in the study. All participants were divided into three groups based on their original classes. These three groups of students all received classroom lessons in English about animals, but only two groups went to a public zoo with a mobile application on location in a zoo. Moreover, only the third group was allowed to take mobile phones home for two weeks. Pre- and posttests were conducted to investigate students' improvement on target words. Based on students' scores, the results show that the third group, which could take the mobile phones home,

improved the most. Students stated that this mobile application motivated them to learn vocabulary in their spare time.

2.1.5 Studies on Language Learning Apps

Since 2007, Stockwell (2010) has spent three years investigating the effects of the mobile phone platform on vocabulary acquisition and claimed that "activities may take longer on mobile phones compared with computers" (p. 107). When he finished his research, he found many of his finding out of date because of highly developing technologies. At that time, the mobile device that his participants used was pre-SmartPhone; then the iPhone and Android platform were released in 2007 and 2008, respectively (Balance, 2012). Thus, the possible technological problems addressed by Stockwell such as Internet assess costs, scoring time, small screens and keypads were resolved soon after new technological innovations were created like Wifi and touch screen (Martinez & Schmitt, 2010). As Stockwell and Sotillo (2011) have pointed out, as language learning apps increasingly develop, it was time for new research carried out on the area of MALL after Stockwell (2010) finished his data collection in 2009.

2.2 Academic Listening Comprehension

2.2.1 Academic Lectures

Compared with a reading style text, an open lecture-style text, as adopted from Swales (2004), is more challenging to learners. Lecture-style speakers usually deliver talks based on their notes or outlines, and most of the time they construct what they want to say on the spot instead of reading a lecture directly from a written text. The advantage of lecture-style speech is that the speakers can easily adapt the content or paraphrase

when they notice listeners' confused facial expressions. On the other hand, there are several disadvantages for the academic lecture audience. For example, speakers may use ungrammatical phrases and informal terms, which could be hard for the audience to comprehend (Salehzadeh, 2006). For other different features of formality and informality lecture styles, Table 2.1 indicates the difference between these two.

Table 2.1 *The Difference between Formal Lecture and Informal Lecture*

Formal Lecture	Informal Lecture
Lecturer may speak from detailed notes, complete text, or PowerPoint	Lecturer may have few notes, may speak "off the cuff" and very casually
Lecturer is only person talking	Lecturer interacts with audience during lecture, allows interruptions and questions; small-group interactions possible
Lecturer follows obvious organizational pattern	Organization pattern may be difficult to follow
Lecturer uses high degree of formal academic terms, mostly complete sentences	Lecturer may use many idioms, phrasal verbs, and slang

Source: Adopted from Salehzadeh (2006)

2.2.2 Listening Comprehension

In the 1960s and early 1970s, the audio-lingual approach became a popular teaching method. In the aspect of listening, the emphasis of the audio-lingual approach is firstly on pronunciation and grammatical forms, and then requires learners to imitate them by repeated drills (Flowerdew & Miller, 2005). To describe the audio-lingual approach, Richards and Rogers (2001) said, "the teaching of listening comprehension, pronunciation, grammar and vocabulary are all related to development of aural fluency" (p. 58). Since the age of audio-lingualism, listening comprehension has held an important place in the field of language teaching, but most second language research has been

conducted in the area of reading comprehension (Lund, 1991). Reading and listening are two different language skills, yet the principles of comprehension can be similar, and thus be applied to both (Anderson, 1983, 1985; Lund, 1991; O'Malley, Chamot, & Kupper, 1989).

As for the genre of lecture for this study, academic listening may be regarded as more challenging than other types of listening, so it is suggested that using the video format of academic lectures might be beneficial to learners. With audio and visual input, non-native language speakers might find it easier to comprehend lectures. Moreover, the audio-visual nature of the lecture makes learners build non-verbal or pragmatic knowledge, facilitate their comprehension, and activate their schemata (Flowerdew, 1994).

When it comes to vocabulary acquisition through watching videos, Duquette, Renie, and Laurier (1998) have found that visual aspects, "animated images, still and pedagogical images, images supported by text" (p. 24), encourage this possibility. Since vocabulary problems could hinder advanced learners from comprehending academic lectures (Kelly, 1991), the function of visual aspects provided by videos might play an important role in learners' vocabulary acquisition through academic lectures.

2.2.3 Listening Comprehension Strategies

According to previous research, language learning strategies are defined as "deliberate, cognitive steps used by students to enhance comprehension, learning and retention of the target language" (Vandergrift, 1996, p. 202, adapted from Rigney, 1978 and O'Malley & Chamot, 1990). Though no research suggests that some learning

strategies or styles are superior to others (Ehrman, Leaver, & Oxford, 2003), it seems that employing appropriate learning strategies is important to successful L2 learners (Nam & Oxford, 1998; Pujola, 2002). O'Malley and Chamot (1990) have defined the three major types of learning strategies as follows:

> *Cognitive strategies* refer to 'the steps or operations used in problem-solving that require direct analysis, transformation or synthesis of learning materials' (Rubin, 1987). . . . *Metacognitive strategies* make use of knowledge about cognitive processes and constitute an attempt to regulate language learning by means of planning, monitoring, and evaluating. . . . *Social/affective strategies* concern the ways in which students elect to interact with other students and native speakers [italics in original] (Ellis, 1994, pp. 536–538).

Vandergrift (1996; 1997) made his own outlines of learning strategies based on O'Malley and Chamot's (1990) and Oxford's (1990) frameworks, but he put more types of cognitive strategies than metacognitive and socio-affective strategies into his framework, as shown in Table 2.2. The reason Vanfergrift (1996) added more cognitive strategies is that he found that they are the most prominent ones as he undertook his study, which was conducted to investigate high school students' use of strategies in learning French. With regard to listening comprehension strategy, Vandergrift suggests that "metacognitive strategies such as selective attention and comprehension monitoring, as well as cognitive strategies such as elaboration and inferencing, are reported more frequently and in more effective combinations by successful listeners" (1997, p. 389).

The taxonomy of listening comprehension strategies chosen for this study was identified, validated, and refined by O'Malley and Chamot (1990) and Vandergrift (1996).

The definitions and examples of listening comprehension strategies provided by Vandergrift (1997) are shown in Table 2.2. The following list includes three main categories: metacognitive strategies (mental activities for directing language learning), cognitive strategies (mental activities for manipulating the language to accomplish a task), and socio-affective strategies (activities involving interaction or affective control in language learning).

Table 2.2 *Listening Comprehension Strategies and their Definitions with Representative Examples*

Metacognitive Strategies

1. **Planning:** Developing an awareness of what needs to be done to accomplish a listening task, developing an appropriate action plan and/or appropriate contingency plans to overcome difficulties that may interfere with successful completion of the task.

1a. **Advance organization:**	Clarifying the objectives of an anticipated listening task and/or proposing strategies for handling it.	I read over what we have to do. I try to think of questions the teacher is going to ask.
1b. **Directed attention:**	Deciding in advance to **attend in general** to the listening **task** and to ignore irrelevant distractors; maintaining attention while listening	I listen really hard. I pick out the words that are familiar so that ... (in combination with **inferencing)**
1c.**Selective attention:**	Deciding to **attend to specific aspects** of language input or situational details that assist in understanding and/or task completion.	I listen for the key words. I establish the speakers in the conversation, their relationship by tone of voice, how they will address each other. This will limit the topics of discussion (in combination with **planning, voice inferencing,**

		and **elaboration).**
1d. **Self-management**	Understanding the conditions that help one successfully accomplish listening tasks and arranging for the presence of those conditions.	I try to get in the frame of mind to understand French. I put everything aside and concentrate on what she is saying.

2. **Monitoring:** Checking, verifying, or correcting one's comprehension or performance in the course of a listening task.

2a.**Compre-hension monitoring:**	Checking, verifying, or correcting one's understanding at the local level.	I translate and see if it sounds right (in combination with **translation).** I just try to put everything together, understanding one thing leads to understanding another.
2b. **Auditory monitoring:**	Using one's "ear" for the language (how something sounds) to make decisions.	I use my knowledge of Portuguese, primarily sound (in combination with **transfer).** I use the sound of words to relate to other words I know.
2c. **Double-check monitoring:**	Checking, verifying, or correcting one's understanding across the task or during the second time through the oral text.	I might catch it at the end and then I'd go back. Sunny in the morning, that's not making sense ...(earlier) it sounded like a cold front, something doesn't make sense to me anymore.

3. **Evaluation:** Checking the outcomes of one's listening comprehension against an internal measure of completeness and accuracy

3a.**Performance evaluation:**	Judging one's overall execution of the risk.	How close was I? (at end of a think-aloud report).
3b. **Strategy evaluation:**	Judging one's strategy use.	I don't concentrate too much to the point of translation of individual words because then you just have a whole lot of words and not how they're strung together into some kind of meaning.
4. **Problem Identification**	Explicitly identifying the central point needing resolution in a task or identifying an aspect of the task that hinders its successful completion.	I'm not sure but "partager" and I'm not really sure what that means. I think that kind of has something to do with that. Music, there is something, ..." des jeux",I don't know what that is.

Cognitive Strategies

1. Inferencing: Using information within the text or conversational context to guess the meanings of unfamiliar language items associated with a listening task, to predict outcomes, or to fill in missing information.

la. **Linguistic inferencing:**	Using known words in an utterance to guess the meaning of unknown words.	I use other words in the sentence. I try to think of it in context and guess.
lb. **Voice and paralinguistic inferencing:**	Using tone of voice and/or paralinguistics to guess the meaning of unknown words in an utterance.	I listen to the way the words are said. I guess, using tone of voice **as** a

		clue.
lc.**Kinesic inferencing:**	Using facial expressions, body language, and hand movements to guess the meaning of unknown words used by a speaker.	I try to read her body language. I read her face. I use the teacher's hand gestures.
1d. **Extralinguistic inferencing:**	Using background sounds and relationships between speakers in an oral text, material in the response sheet, or concrete situational referents to guess the meaning of unknown words.	I guess on the basis of the kind of information the question asks for. I comprehend what the teacher chooses to write on the board to clarify what she is saying.
le. **Between parts inferencing:**	Using information beyond the local sentential level to guess at meaning.	Because in the beginning she said "course," so maybe it was, maybe it was a race ... may be a horse race ... You pick out things you do know and in the whole situation piece it together so that you do know what it does mean.

2. Elaboration: Using prior knowledge from outside the text or conversational context and relating it to knowledge gained from the text or conversation in order to predict outcomes or fill in missing information

2a. **Personal elaboration:**	Referring to prior experience personally.	I think there is some big picnic or a family gathering, sounds like fun, I don't know ... You know ... maybe they missed each other, because that happens to me lots we just miss accidentally and then you call up and say, "Well, what happened?"

2b. **World elaboration:**	Using knowledge gained from experience in the world.	Recognizing the names in sports helps you to know what sport they are talking about. I use the topic to determine the words that I will listen for (in combination with **selective attention).**
2c. **Academic elaboration:**	Using knowledge gained in academic situations.	I know that] from doing telephone conversations in class. I relate the word to a topic we've studied. I try to think of all my background in French.
2d. **Questioning Elaboration**	Using a combination of questions and world knowledge to brainstorm logical possibilities.	Something about sixty-one, restaurant, sixty-one. Maybe it's the address. Um, he said he started, probably fixing up his apartment, something about his apartment. Probably just moved in, um, because they're fixing it up.
2e. **Creative Elaboration**	Making up a story line, or adopting a clever perspective.	Sounded like introducing something, like it says here is something but I can't figure out what it is, it could be like ... one of the athletes, like introducing some person or something. I guess there is a trip to the Carnival in Quebec so maybe it is like something for them to enter a date, to write or draw ...
2f. **Imagery:**	Using mental or actual pictures or visuals to	I can picture the words in my

	represent information; coded as a separate category but viewed as a form of elaboration.	mind. I make pictures in my mind for words I know, then I fill in the picture that's missing in the sequence of pictures in my mind.
3. Summarization	Making a mental or written summary of language and information presented in a listening task.	I remember the key points and run them through my head, "what happened here and what happened here" and get everything organized in order to answer the questions.
4. Translation:	Rendering ideas from one language to another in a relatively verbatim manner.	I translate. I'll say what she says in my head, but in English. A little voice inside me is translating.
5. Transfer:	Using knowledge of one language (e.g., cognates) to facilitate listening in another.	I try to relate the words to English. I use my knowledge of other languages: English to understand German and Portuguese (primarily sound) to understand French.
6. Repetition:	Repeating a chunk of language (a word or phrase) in the course of performing a listening task.	I sound out the words. I say the word to myself.
7. Resourcing:	Using available reference sources of information about the target language, including dictionaries, textbooks, and prior work.	I look it up in a dictionary. I look in the back of the book.

8. **Grouping:**	Recalling information based on grouping according to common attributes.	I try to relate the words that sound the same. (in combination with **auditory monitoring).** I break up words for parts I might recognize.
9. **Note-taking:**	Writing down key words and concepts in abbreviated verbal, graphic, or numerical form to assist performance of a listening task.	I write down the word. When I write it down, it comes to my mind what it means.
10. **Deduction/ induction:**	Consciously applying learned or self-developed rules to understand the target language.	I use knowledge of the kinds of words such **as** parts of speech.
11.**Substitution:**	Selecting alternative approaches, revised plans, or different words or phrases to accomplish a listening task.	I substitute words, translate and see if it sounds right (in combination with **translation** and **comprehension monitoring).**

Socioaffective Strategies

1. **Questioning for clarification:**	Asking for explanation, verification, rephrasing, or examples about the language and/or task; posing questions to the self.	I'll ask the teacher. I'll ask for a repeat.
2. **Cooperation:**	Working together with someone other than an interlocutor to solve a problem, pool information, check a learning task, model a language activity, or get feedback on oral or written	I ask someone who knows the word. I ask a friend. I ask the person next to me.

	performance.	
3. **Lowering anxiety:**	Reducing anxiety through the use of mental techniques that make one feel more competent to perform a listening task.	I think of something funny to calm me down. I take deep breaths.
4. Self-Encouragement	Providing personal motivation through positive self-talk and/or arranging rewards for oneself during a listening activity or upon its completion.	I try to get what I can. O. K ... my hunch was right. I tell myself that everyone else is probably having some kind of problem as well.
5. **Taking emotional temperature**	Becoming aware of, and getting in touch with one's emotions while listening, in order to avert negative ones and make the most of positive ones.	I take it home and take it out on my family. O.K. I'm getting mad 'cause I don't understand.

Source: Adopted from Vandergrift (1997, p. 392-395)

2.3 Vocabulary Acquisition and Assessment

2.3.1 The Importance of Vocabulary

When it comes to language learning, vocabulary is the foundation and plays an important role (Chen, 1999; Krashen, 1989; Laufer, 1997; Nation, 1990; Yang, 2003). To emphasize the importance of vocabulary, Krashen (cited in Hudson's book in 2007) says that "language learners do not carry around grammar books, they carry around dictionaries" (p. 227). Wilkins (1972) states that, "without grammar very little can be conveyed, without vocabulary nothing at all can be conveyed" (p. 111). Harmer (1994) has also made similar statements as "If language structure makes up the skeleton of

language, then it is vocabulary that provides the vital organs and the flesh" (p. 153). Nation (2001) also says that vocabulary seems to be the basic part of English sentences, so vocabulary learning is essential to English learning.

According to Laufer's study (1992), it is necessary for readers to acquire 95% familiar words and 2% unfamiliar words to comprehend a text. Laufer also indicates that learners should be equipped with at least 3,000 word families for comprehending unsimplified materials. More and more research has been done on EFL learners' vocabulary learning, much of which has indicated that learners with poor vocabulary often have difficulties comprehending or inferring the context when reading English articles (Gu, 2003; Huang, 2007; Nation, 2001). However, studies show that Taiwanese students' lack of vocabulary is the main hindrance that prevents them from comprehending English texts with ease (Chen, 1998, 1999; Chern, 1993; You, Tsai, Chuang, Kuo, & Lu, 2000). It seems that the lack of vocabulary would be hard for learners to understand English materials on their own. Thus, learners need to have a large quantity of vocabulary to become successful language learners.

However, it is impossible for learners to acquire sufficient vocabulary through explicit instruction by teachers at school, so learners must learn most of these words by themselves (Nation, 1990; 2001). In order for learners to learn a great deal of words efficiently, language teachers should introduce learners to some vocabulary learning strategies and provide them more opportunities to be exposed to the target language so that they can acquire vocabulary efficiently (Nation, 1990, 2001; Schmitt, 2000; Parry, 1997).

2.3.2 Incidental Vocabulary Acquisition through Academic Lectures

As a language component, vocabulary can be acquired through listening. When the main goal of learning is on listening comprehension instead of vocabulary learning, this kind of learning is called incidental vocabulary learning. In this case, vocabulary words that learners acquire during the process of listening are regarded as "by-product" of the main learning activity (Perez & Desmet, 2012, p.154).

In one study, Vidal (2003) investigated the acquisition of EFL vocabulary through academic listening. Factors that might affect vocabulary acquisition were examined. The factors were participants' current English proficiency level, lecture comprehension, frequency of occurrence, type of word, type of elaboration, and predictability from word form and parts. Participants, from a course called a Diploma in Tourism, were given three video-taped lectures to watch. The topics of the videos were on the economic, sociocultural, and environmental impacts of tourism. All 116 students were tested for their lecture comprehension with 15-item true-false tests and target words measured by the Vocabulary Knowledge Scale (VKS) in intact classes. The results indicate that both lecture comprehension and EFL proficiency are significant factors in vocabulary acquisition. Moreover, learners could acquire vocabulary incidentally through academic lectures, though vocabulary gain was retained in the memory for four weeks.

Another study, conducted by Smidt and Hegelheimer (2004), investigated the effect of EFL online learning performances on listening comprehension and incidental vocabulary acquisition with an authentic video. 24 EFL students who enrolled in a listening comprehension class participated in the study. In addition to a listening

comprehension multi-choice question test, they took pre-, post-, and delayed vocabulary post-tests. Nine of them were also monitored by a screen capturing application called Camtasia Recorder (2001) to further investigate learners' performances on learner-CALL activity interaction and their strategy use. The results show that the CALL activity with academic video-watching helps in acquiring incidental vocabulary, and advanced learners not only used metacognitive learning strategies but also cognitive learning strategies.

In a more recent study, which was done by Yang (2011), 65 Taiwanese undergraduates were recruited and required to view three assigned lectures via Open Course lectures. Before beginning the experiment, they were given a pretest to determine their current general English proficiency level and their knowledge of 33 target words. They took both a pretest and a posttest to examine their vocabulary acquisition by using VKS and to examine their lecture comprehension after viewing lectures. The results indicate that EFL learners are able to acquire incidental vocabulary through watching academic lectures just one time. Among the three types of target words, learners got higher scores on technical words than low frequency and academic words. Moreover, the verbal elaboration was found to be an important factor for vocabulary acquisition. Learners' vocabulary expanded greatly as they received more explicit elaboration. Overall, learners were satisfied with the learning experience from Open Course lectures.

2.3.3 Vocabulary Assessment: Vocabulary Knowledge Scale (VKS)

According to Read (2000), the VKS is an instrument that researchers use to assess the target words in order to examine how much study participants gained. Wesche and Paribakht (1996) explain, "It's [VKS's] purpose is not to estimate general vocabulary

knowledge, but rather to track the early development of specific words in an instructional or experimental situation" (p. 33).

There are two scales: one for eliciting learners' answers and one for scoring their answers. Test-takers are given the first scale (see Figure 2.1) and a list of target words to do a self-report. This scale includes five steps, or categories, as Paribakht and Wesche (1997, pp. 179–180) prefer to use these terms.

Self-report categories

I. I don't remember having seen this word before.

II. I have seen this word before, but I don't know what it means.

III. I have seen this word before, and I think it means _____. (synonym or translation)

IV. I know this word. It means _____. (synonym or translation)

V. I can use this word in a sentence: _____. (Write a sentence.)

(If you do this section, please also do Section IV.)

Figure 2.1 The Vocabulary Knowledge Scale (VKS) Elicitation Scale (adopted from Paribakht and Wesche, 1997, p. 180)

Provided with this scale, test-takers are required to determine which category could best represent their knowledge of target words. For the first category, it means that test-takers are not able to recognize the words. For the second category, test-takers do not know the meaning of the word but at least recognize it. The results of the first two

categories rely mainly on the test-takers' honesty. From the third to fifth categories, verifiable evidence is required. The distinction between Categories III and IV depends on how sure test-takers are about the meaning of word. No matter which decision they made, they have to provide evidence to demonstrate their understanding by synonym or translation. In the last category, test-takers need to use the word to make a sentence to show that they know how to use it. In this stage, it moves from receptive knowledge to production (Read, 2000).

Once test-takers finish self-reporting their knowledge of a word, their answers are transformed into points based on their performance. The scoring scale is shown below (see Figure 2.2).

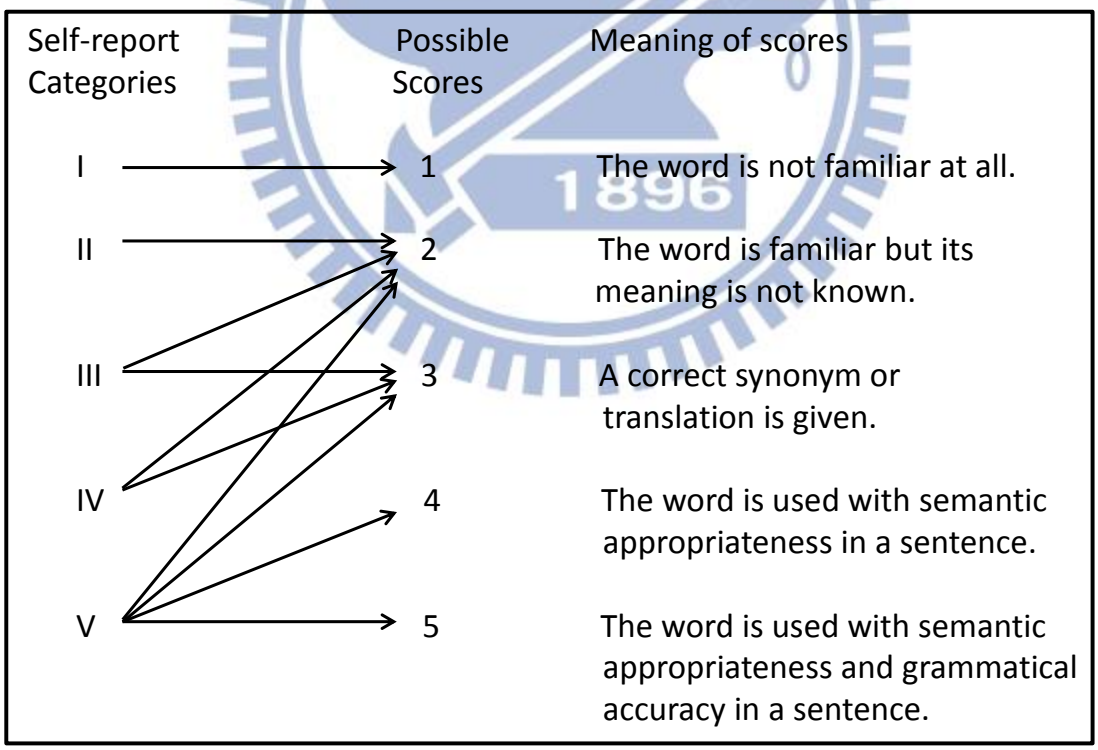


Figure 2.2 The VKS Scoring Categories
(adopted from Paribakht and Wesche, 1997, p. 181)

Read (2000) provides explicit description and criteria for VKS scoring categories. Test-takers can receive one score if they state that their knowledge of a word belongs to Category I. In the same way, they can get two points if they choose Category II. As the arrows in Figure 2.3 indicate, test-takers only get two points when they claim their knowledge of a word is at a higher category but cannot provide correct a answer in Category III.

On the other hand, if they provide an acceptable synonym or translation, they are rewarded three points. Points of four and five are given to test-takers for writing sentences in response to Category V. The difference between a score of four and a score of five is that test-takers only receive four points if they put a target word in an appropriate context but do so ungrammatically. For example: "This famous player announced his retire" (Read, 2000, p. 133). To receive five points, test-takers need to provide a sentence that is both correct in grammar and meaning.

CHAPTER THREE

METHODOLOGY

3.1 Research Design

The main research method employed in this study was a within-subject design. Both qualitative and quantitative data were collected. In terms of quantitative data, participants were required to take pre- and posttests on vocabulary acquisition and a listening comprehension test in the classroom. The 35 participants were given one week for self-learning through their smartphones in their spare time. On the last day of the one-week self-learning, participants received a link to an online questionnaire through LINE, a new communication app that allows people to make free voice calls and send free messages. The online questionnaire consisted of four sections: (1) participants' background information, (2) participants' use of listening comprehension strategies, (3) their attitude toward the MALL activity, and (4) other information. As for qualitative data, 15 of the participants were interviewed to further investigate their responses on the online questionnaire.

3.2 Participants

3.2.1 Recruiting the Participants

With all the advantages of MALL mentioned above, a major disadvantage of it may be underestimated, which is the "universal ownership of smartphones", since smartphones might still be too expensive for some people to afford (Kukulska-Hulme,

2009, p. 8). As also indicated in the results of Traxler's study (2007), higher education students are seen to be more ready to adopt mobile learning than K–12 students because of the increase of ownership of mobile devices in higher education. In terms of ownership of smartphones, it is more reasonable to recruit adult learners than others as participants for this study since they may be more likely to afford smartphones.

The aim of this study was to explore how EFL adult English learners use smartphones to acquire English vocabulary incidentally through academic listening materials. In their research, Hulstijin, Hollander, and Greidanus (1996) indicate that intermediate and advanced EFL students increase their vocabulary largely through incidental vocabulary learning. Therefore, the researcher recruited participants whose English proficiencies were at least at the intermediate level and promoted the research on Bulletin Board System (BBS). As long as learners reported that they were at least at the intermediate level and they had their own smartphones, they were welcomed to participate in this study.

Not every participant is student. 28 participants are undergraduate or graduate students in northern Taiwan. The rest 7 of them are non-students and work in northern Taiwan. Students have free wireless access on campus, in the dormitory, and in any building at school, so they had no difficulty using their smartphones to access the Internet when they are at school. When students are on campus, they can watch videos via their smartphones as many times as possible in their leisure time. Before the experiment started, participants were given a TOEFL iBT listening test to assess their current English listening abilities.

3.2.2 TOEFL iBT Listening Test

Table 3.1 shows the summary of descriptive statistics of the 35 participants' TOEFL iBT listening scores. Out of 30 points in the TOEFL iBT listening test, the results show that the lowest points and the highest points are 11 and 27 respectively, so the range between minimum and maximum is 16. The mean score is about 17.40 and standard deviation is about 4.55.

Table 3.1 *Summary of Descriptive Statistics of TOEFL Listening Scores*

	N	Range	Minimum	Maximum	Mean	Std. Deviation
TOEFL Scores	35	16	11	27	17.40	4.55

Figure 3.1 displays the 35 participants' TOEFL iBT listening scores individually. Out of a possible total of 30 points, the highest point is 27 and the lowest point is 11. The results show that no one got 23 points, the number of people got 15 points is five, and for 14 or 20 points is four. The number of participants getting 15 points is the highest in this TOEFL iBT listening test.

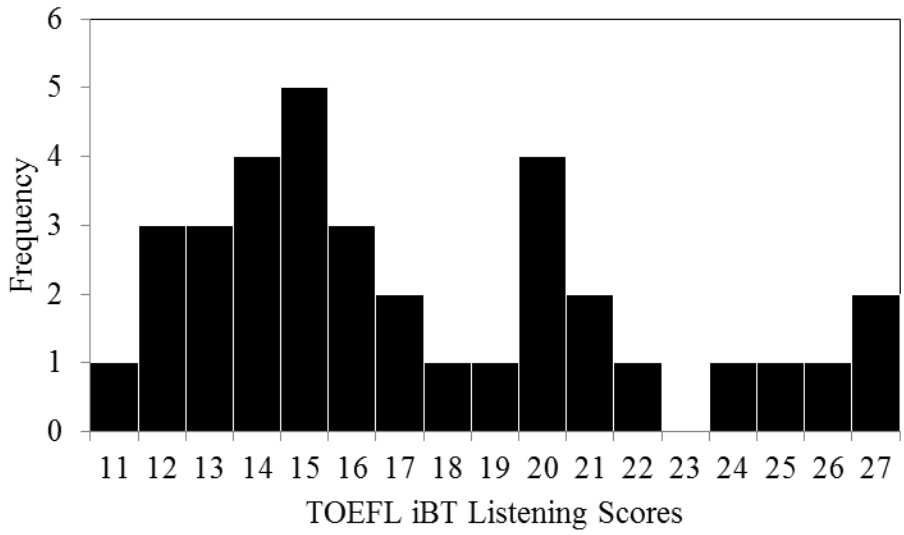


Figure 3.1. The Distribution of Individual's TOEFL iBT Listening Scores

In order to investigate participants' current listening abilities more precisely, a score scale was used. Figure 3.2 shows the criteria of score range for each level. All test-takers can be divided into these three levels based on their listening test scores, and the three levels are high (22–30), intermediate (15–21), and low (0–14), according to the TOEFL score scale from the official website (http://www.ets.org/toefl/ibt/scores/understand).

Figure 3.2 The Screenshot of TOEFL Score Scales

Table 3.2 displays each participant's TOEFL iBT listening test score and their ranking among the 35 participants. As can be seen below, some got the same score, so they were put in the same rank. For example, two participants (No. 17 and No. 35) received 27 points, so they were considered in the first rank. The high group consisted of participants who got the first six highest scores. Those in the intermediate group were ranked from the seventh to the twentieth. The rest, from the last tenth to the last one, were in the low group.

Table 3.2 *Participants' Ranks and Scores on the TOEFL iBT Listening Test*

Group	ID	Score	Rank
High (22-30)	No.17	27	1
	No.35	27	
	No.15	26	3
	No.34	25	4
	No.28	24	5
	No.21	22	6
Intermediate (15-21)	No.4	21	7
	No.27	21	
	No.10	20	9
	No.11	20	
	No.22	20	
	No.32	20	
	No.12	19	13
	No.24	18	14
	No.13	17	15
	No.25	17	
	No.26	16	17
	No.30	16	
	No.31	16	
	No.1	15	20
	No.8	15	
	No.14	15	
	No.16	15	
	No.33	15	

Low (0-14)	No.5	14	25
	No.6	14	
	No.19	14	
	No.23	14	
	No.2	13	29
	No.18	13	
	No.20	13	
	No.7	12	32
	No.9	12	
	No.29	12	
	No.3	11	35

The distribution of participants' TOEFL iBT Listening Scores by group is shown in Figure 3.3, and the numbers of participants at low, intermediate, and high levels are 11, 18, and 6, respectively. As is shown, most of the participants are at the intermediate level (15–21) in this TOEFL iBT listening test. Since more than half of the 35 participants are at intermediate or high level, they can be assumed to have little difficulty comprehending lectures by themselves.

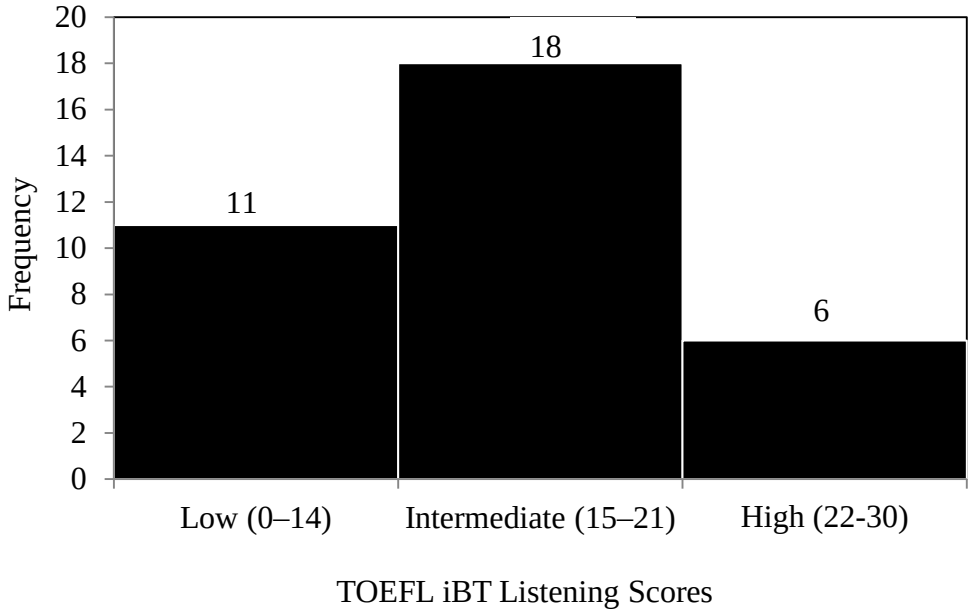


Figure 3.3. The Distribution of Participants' TOEFL iBT Listening Scores by Group

3.3 Materials

There were three reasons for selecting video clips as this study' language input. Most previous studies were conducted on direct vocabulary learning with first language (L1) or native language translation, and few were on vocabulary learning through listening in authentic contexts. Therefore, the first reason for selecting video clips was to expose learners to authentic materials, because EFL learners have less chance to get authentic input from native English speakers. Secondly, video clips provide learners with more listening practices because learners can access the listening materials as many times as possible. Learners can also listen to specific segments repeatedly at their leisure time in order to increase their listening comprehension. The third reason for using video clips is that smartphones are considered appropriate devices for learning segment materials. Learners could also make good use of small segments of time with their smartphones.

3.3.1 Selection of TED Talks for the Experiment

The use of authentic materials has been promoted in recent times, and Coady (1997) has explained that the simplified texts that have been used as learning materials are criticized as not being "authentic." Because of the simplified form of these texts, some grammar or vocabulary usages were rewritten and are not original sources for learners. This deprives learners' opportunities for gaining exposure to "real" texts that they might read in daily life (Huckin, 1983; Widdowson, 1979).

Among several worldwide popular apps, TED App serves as one of the listening library apps for ideas spreading and language learning. It contains a variety of short video clips uploaded and posted by the official company. TED Talks were chosen as the listening materials for this study because they provide academic mini-lectures which are regarded as authentic materials. The lectures were presented by experts in a variety of fields to a public audience and recorded. According to TED (http://www.ted.com/) — which originally stood for Technology, Entertainment and Design in 1984 — it now invites speakers in different fields to deliver lectures on a variety of topics, including business, science, and global issues, in addition to technology, entertainment, and design. Speakers are supposed to finish their speech within a maximum of 18 minutes.

Since 2006, audiences can watch TED Talks online with English subtitles or other international language subtitles. There are now more than 1,500 TED Talks on its websites for audiences to learn English for Academic Purpose (EAP) and gain inspiration. Learners can also now watch TED Talks through TED App on their smartphones. The screenshot of the TED App is shown in Figure 3.4.

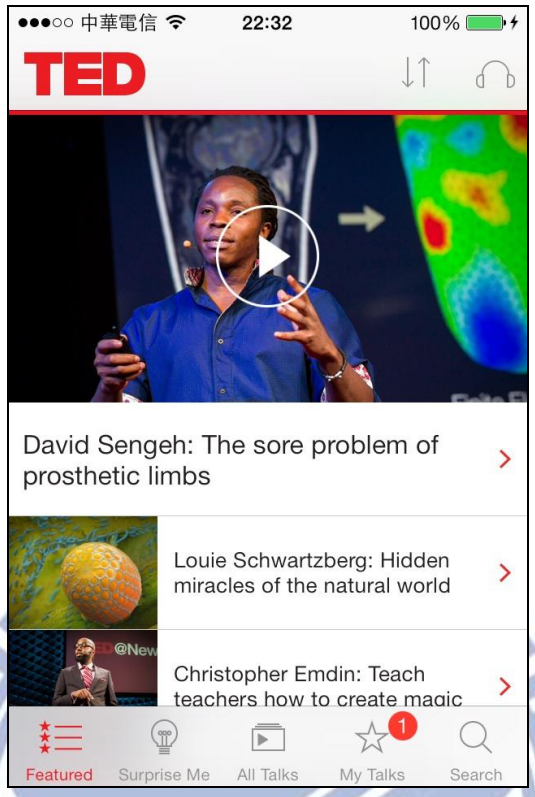


Figure 3.4 The Screenshot of TED App

Among 1,500 TED Talks, some of the video clips are particularly interesting, but some may not be appropriate for language learning research because of the speakers' unusual accents or their disorganized delivery. Therefore, the researcher assigned three specific video clips for learners to watch. Learners were able to "search" the topics of the assigned TED Talks on TED App.

The following was the criteria of content selection (adapted from Yang, 2011) for the assigned mini-lectures:

1. Lectures should not be too long, with maximum of 10 minutes.

2. Lectures should be equipped with a high quality of video and visual.

3. Lectures should be well organized.

4. Lectures should be from different subject areas to avoid being affected by participants' background knowledge.

5. Lectures should be provided with full transcriptions (for selecting target words).

The three TED Talks selected for this study were considered "potentially interesting." They were related to three different themes: music, technology, and medicine. Appendix A offers transcripts for the three assigned TED Talks. Table 3.3 provides further information about the three lectures.

Table 3.3 *Details of the Three Selected TED Talks*

Speaker	Topic	Duration	Posted Time
Ryan Holladay	To hear this music, you have to be there	06:29	Jan, 2014
Krista Donaldson	The $80 prosthetic knee that's changing lives	09:55	Dec, 2013
Jack Andraka	A promising test for pancreatic cancer ---from a teenager	10:49	July, 2013

3.3.2 Selection of Target Words

The criteria for each word type were as follows: Firstly, the researcher selected some potential words that might be unfamiliar to participants. Then, the researcher examined those words carefully based on Coxhead's (2000) academic word list, Chung and Nation's (2004) definition of technical vocabulary, and Word Frequency Data, Corpus of Contemporary American English (COCA) (http://www.wordfrequency.info). If the target words selected from the assigned lectures appeared in the academic word list or met the

definition of technical vocabulary, then they were regarded as target words for this study. As for the lower frequency words, if the potential unfamiliar words could not be classified into academic words, technical words, or Word Frequency Data from COCA, they were considered low frequency words. The researcher then consulted a professor from the area of Teaching English to Speakers of Other Languages (TESOL) to confirm that these words were likely to be unfamiliar to participants. The criteria for vocabulary selection were also confirmed.

From the three assigned TED Talks, 25 target words were chosen (Appendix B) for pre-and post-tests and divided into the categories of academic words, technical words, and low frequency words. The numbers of academic words, technical words, and low frequency words were 9, 9, and 7, respectively. The detailed information of these 25 target words are shown in Appendix B.

3.4 Instrumentation

3.4.1 Lecture Comprehension Test

After participants watched three academic mini-lectures of less than 10 minutes each, their listening comprehension was assessed to check their general understanding. There were 10 multiple-choice comprehension questions for each lecture, so participants were asked 30 questions in total for these three assigned TED Talks. The 30 multiple-choice comprehension questions were devised by the researcher based on the specifications suggested by Peterson (2001) for the first to the fourth specifications, and on those suggested by Smidt and Hegelheimer (2004) for the fifth specification (Table 3.4).

Participants were encouraged to guess if they had no idea about the answer. The maximum score they could get was 30.

Table 3.4 *Specification of the 10 Listening Comprehension Questions*

Specification	Number of questions
1. Select details from the text; recognize pertinent details in the speech stream	6
2. Get the gist or main idea of a passage; find main ideas and supporting details; find the main idea of a lecture segment	1
3. Recognize the topic; listen to identify the speaker or the topic	1
4. Make inferences; make inferences about the text	1
5. Define a term	1

Source: Adopted from Smidt & Hegelheimer (2004)

3.4.2 Vocabulary Knowledge Scale (VKS)

All participants were given two target words tests — a pretest and posttest. The participants' vocabulary scores were measured by VKS (Appendix C). This scale was used in Paribakht and Wesche's (1993) study to examine non-native English speaking learners' incidental vocabulary learning through authentic materials, which is also the main goal of the study.

The numbers of target words chosen from each assigned TED Talks were 6, 8, and 11, respectively, so the participants were tested on 25 words total. On pre- and posttests, participants were given a self-report sheet with five categories and a list of the 25 target words. They were required to choose one category that best represented their knowledge of each word. After the participants finished the pretest and posttest by self-reporting,

their performances were synthesized by a 0–5 point scoring scale. In this scale, the researcher adapted Paribakht and Wesche's (1997) and Vidal's (2003) scoring scales as shown in Table 3.5.

Table 3.5 *The Vocabulary Knowledge Scale*

Score	Descriptions
0 point	The test taker is not familiar with the word and has no idea about its meaning.
1 point	The test taker is familiar with the word but has no idea about its meaning.
2 point	The test taker has a vague/partial idea of the meaning of the word.
3 point	The test taker provides a correct synonym or Chinese translation.
4 point	The test taker uses the word with semantic appropriateness in a sentence.
5 point	The test taker uses the word with semantic appropriateness and grammatical accuracy in a sentence.

Additionally, the researcher also asked a graduate student from the area of TESOL to be another rater to assure the reliability of participants' vocabulary scores. Before doing coding, this rater has been trained in a workshop by the researcher. In the beginning, while giving scores to participants, the researcher asked the second rater to monitor 5% of the target entries that were conducted in pilot study. Then, the second rater was required to give scores as well. After finishing scoring, the researcher compared the differences and discussed them with the inter-rater. Since the inter-rater reliability in the pilot study was about 0.98, which reached an acceptable criterion, the researcher asked the same person to be the inter-rater in the main study.

3.4.3 Online Questionnaire

The questionnaire consisted of four sections. The first section collected the participants' background information. The second section investigated the listening strategies that participants used when completing listening tasks. In the third section, participants' attitudes toward this MALL activity were examined. The last section gathered additional information about this MALL activity. To ensure that participants understood every question, the questions were written in their native language — Mandarin.

To investigate learners' use of listening comprehension strategies, several questions were composed by the researcher based on Vandergrift's (1997) taxonomy and some characters of smartphones. The researcher only included two of the three main categories: metacognitive strategies (mental activities for directing language learning) and cognitive strategies (mental activities for manipulating the language to accomplish a task). The reason for excluding socio-affective strategies was that this study only deals with learner-smartphone interaction instead of exploring the interaction between learners, so it would have been unnecessary to include socio-affective strategies. Questions for listening strategy use consisted of 11 questions for metacognitive strategies and another 11 questions for cognitive strategies (see Appendix F).

In the third section of the online questionnaire, an attitude questionnaire adapted from Davis' (1989) Technology Acceptance Model (TAM) was utilized to evaluate learners' attitudes toward this MALL activity. The content of this section included: (1) perceived usefulness, (2) perceived effectiveness, and (3) perceived satisfaction. In order

to investigate these three aspects, a 12-item questionnaire was used, with four questions in each aspect, based on a five-point Likert scale (see Appendix F).

The researcher consulted a professor with expertise in this area to review and give feedback on the questions before they were given out to the participants in the pilot study. After making some modifications, the researcher piloted the revised version of the online questionnaire among a representative sample (about five people) of the research population. Based on the professor's and piloting participants' advice, the researcher made the wording more concise and logical. In order to not make participants' fatigue affect reliability, the order of questions for asking participants' metacognitive and cognitive strategy use was given at random, which was a modification made after the pilot study. For example, question No. 1, 3, 5, 6, 8, 11, 13, 17, 19, 20, 21 were about participants' metacognitive strategy use while question No. 2, 4, 7, 9, 10, 12, 14, 15, 16, 18, 22 were about their cognitive strategy use. Lastly, the final version of the online questionnaire for the participants in the main study was created.

3.4.4 Semi-structured Interview

The objective of the semi-structured interview was to further investigate participants' listening comprehension strategies on the smartphone-based listening practice as well as their attitudes toward MALL activity. Among 20 volunteer interviewees, the researcher chose 15 of them, based on their responses to the online questionnaire, for a 10-minute semi-structured interview. Before the interview, they all agreed to be videotaped (only their smartphones and their fingers during the process of demonstration were taped) and recorded. In order to help the interviewees have fresh

memories of the one-week independent learning, the researcher interviewed them immediately after the experiment was finished.

There were two parts to the interview. First, to recall memories, the interviewees were asked to briefly demonstrate how they use their smartphones to watch TED Talks while telling the researcher the reasons behind their learning behavior. While they were showing the researcher how they used their smartphones, the researcher videotaped the whole process and recorded their opinions. Then in the second part of the interview, the researcher moved the camera off to the side and only recorded the interviewees' opinions while asking them further questions about their listening strategy use and attitudes toward MALL activity.

The interview questions included four parts: (1) 5 questions (the mean scores were under three points) for every interviewee, (2) 18 questions (only those received less than three points by some people) for individual, (3) an open-ended question about other listening strategy use, and (4) a final question about the advantages and disadvantages of this MALL activity (see Appendix G).

3.5 Data Collection Procedure

The duration of this experiment was about one month. Other detailed information of the study is provided in Table 3.6. Details include tasks the researcher planned, tests the participants took, and the amount of time each test took during this month.

In the first week, all participants were informed of the goal and the process of the study. After participants agreed and signed the consent forms, they were given a TOEFL

listening test without previous notice to investigate their current English listening abilities. As for the pretest, participants were given a list of the 25 target words to determine whether they already knew these words. In order to not have participants recall target words from the pretest, there was a one-week interval between the pretest and the one-week independent learning with smartphones. The reason for having a one week interval was that participants might pay more attention to those words while watching the three assigned TED Talks if they remembered the target words vividly.

Then, in the third week, participants received two documents through LINE, which is a free smartphone app for contacting participants. One document gave instruction for the one-week independent learning with smartphones (see Appendix D). The other document gave instruction for the TED app, including steps for downloading the app on their smartphones (see Appendix E). TED Talks have already been provided on TED app, so participants could find the topics of the assigned TED Talks by using the "search" function of the application. Participants were given one week (seven days) to watch the three assigned video clips on their smartphones in their leisure time. To assess participants' incidental vocabulary acquisition, they were only informed about the listening comprehension test, and anything about vocabulary measurement in the posttest was not mentioned.

The participants did not receive the link to the online questionnaire until the seventh day of the independent learning task. The online questionnaire was to explore participants' listening comprehension strategy during the one-week independent learning with smartphones and their attitudes toward this MALL activity. Participants were

required to finish this online questionnaire one day after they finished the one-week independent learning.

During the final week, participants were required to take two tests: a posttest on vocabulary acquisition and a listening comprehension test. To prevent participants from using a dictionary or discussing the questions with each other, they were required to take these tests in person instead of taking them online. While taking the posttest, participants were not allowed to use their smartphones or talk with other people. After finishing these tests, those who would like to share their learning experiences made an appointment with the researcher. On another day the participants gave semi-structured interviews. The researcher interviewed 15 participants within one week after the experiment concluded.

Table 3.6 *Procedure of the Experiment*

Week	Activities	Test	Duration
Week 1	1. Introduction of the research goal 2. Signing consent forms	1. TOEFL Listening Test 2. Target words pretest	90 min.
Week 2	X	X	X
Week 3	Independent learning with smartphones (Watch three assigned TED Talks)	Online questionnaire	7 days
Week 4	X	1. Target words posttest 2. Listening Comprehension Test	60 min.
Week 5	X	Semi-structured Interview	10 min.

3.6 Data Analysis

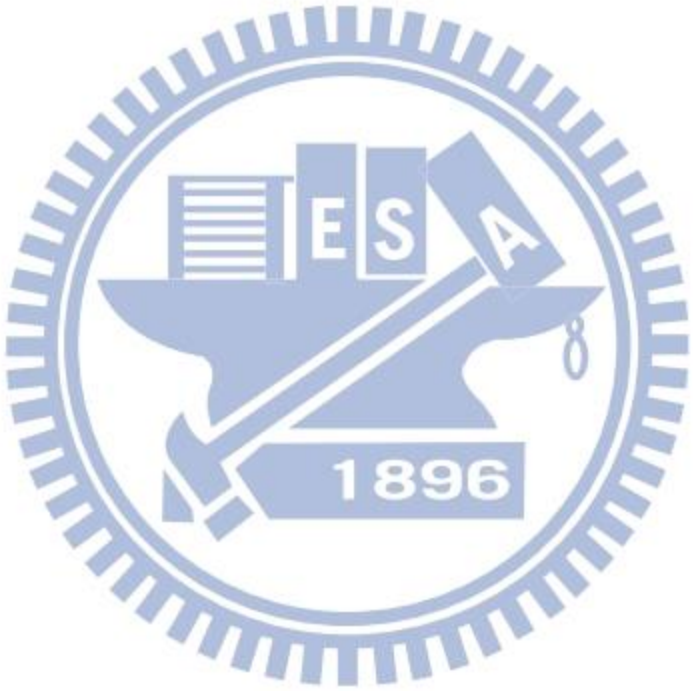
Both qualitative and quantitative data were collected within a month of the completion of the experiment. Statistical Package for Social Science (SPSS), a software package used for statistical analysis, were implemented for analyzing quantitative data such as participants' learning performance, and the qualitative analysis of participants' attitudes expressed in the interviews was also implemented.

For quantitative analysis, the researcher subtracted participants' vocabulary scores on the posttest and pretest and then calculated the frequency, mean score, and standard deviation via SPSS to examine participants' incidental vocabulary gains. Further, a paired *t* test was used to examine whether there was a statistically significant difference between participants' pretests and posttests.

To answer the second research question, the research conducted descriptive statistics via SPSS to illustrate the frequency of the types of listening comprehension strategies used by EFL adult learners. The report of descriptive statistics consisted of the mean score and standard deviation of each listening metacognitive and cognitive strategy. Moreover, for the third research question, a correlation analysis was conducted to examine whether there was a statistically significant relationship between participants' listening strategy use and their incidental vocabulary gains. Finally, for the last research question, descriptive data analysis was conducted to examine participants' attitudes toward this MALL activity on the aspects of usefulness, effectiveness, and satisfaction.

In order to triangulate the results of participants' listening comprehension strategy use and their attitudes toward the MALL activity taken from the online questionnaire, the qualitative data drawn from the interview would be used for qualitative analysis. After

interviewing 15 participants, their statements were coded based on the pre-constructed interview questions. These results were used for triangulating the results from the online questionnaire.



CHAPTER FOUR

RESULTS

In this chapter, the results of the study are provided. Both quantitative and qualitative data are presented chronologically. In addition to results, this section also includes a statistical analysis with brief comments.

4.1 Incidental Vocabulary Acquisition

A modified version of Paribakht and Wesche's (1997) and Vidal's (2003) VKS was used to measure participants' vocabulary acquisition. In order to keep the results of the vocabulary scores be more reliable, the researcher invited one graduate student from the institute of TESOL to be the second rater. The inter-rater reliability for the pretest and posttest were 0.99 and 0.99, which indicated that the two raters had high agreement on both the pretest and posttest. The reliability for the vocabulary pretest and posttest were 0.83 and 0.84, which implied that this vocabulary measurement reached acceptable reliability.

Table 4.1 presents participants' vocabulary scores, including pretest and posttest, and also their individual ranking among all 35 participants. As shown in the column of differences between pretest and posttest, participants' scores increased on the posttest. Based on the differences between pretest and posttest, participants were ranked from the first to the last. For example, the one whose vocabulary scores increased the most was ranked as the first.

Table 4.1 *Participants' Ranks and Scores on the Vocabulary Test*

ID	Pretest	Posttest	Differences between Pretest-Posttest	Rank
03	57.00	114.00	57.00	1
14	48.50	89.00	40.50	2
33	65.00	104.00	39.00	3
29	58.50	93.00	34.50	4
22	31.00	65.00	34.00	5
10	30.50	63.00	32.50	6
26	75.50	107.00	31.50	7
27	68.50	99.00	30.50	8
32	53.50	83.00	29.50	9
15	68.50	94.50	26.00	10
09	35.50	60.50	25.00	11
25	45.50	70.50	25.00	11
30	58.00	81.00	23.00	13
11	44.50	66.50	22.00	14
16	42.00	63.50	21.50	15
12	57.50	78.50	21.00	16
20	23.50	44.00	20.50	17
13	54.50	74.50	20.00	18
02	49.00	68.00	19.00	19
28	59.50	78.50	19.00	19
35	58.50	77.00	18.50	21
19	72.50	90.00	17.50	22
24	50.00	67.50	17.50	22

08	55.50	72.50	17.00	24
21	73.00	90.00	17.00	24
04	73.00	86.00	13.00	26
34	90.50	103.50	13.00	26
23	56.50	69.00	12.50	28
31	28.00	40.00	12.00	29
07	58.50	69.50	11.00	30
18	63.00	73.50	10.50	31
06	70.00	79.00	9.00	32
01	57.50	66.00	8.50	33
17	74.00	80.00	6.00	34
05	38.00	43.50	5.50	35

Table 4.2 offers a descriptive analysis of the differences between the pretest and posttest. On the pretest, the lowest score was 23.5 and highest score was 90.5. However, on the posttest, the lowest score was 40 and the highest score was 114. The mean score of these 35 participants' performance increased from 55.56 (SD= 15.21) on the pretest to 77.26 (SD= 17.45) on the posttest, suggesting that the smartphone learning activity could facilitate incidental vocabulary learning.

Table 4.2 *Descriptive Analysis of Vocabulary Pretest and Posttest*

Test	N	Minimum	Maximum	Mean	Standard deviation
Pretest	35	23.50	90.50	55.56	15.21
Posttest	35	40	114	77.26	17.45

Table 4.3 shows the summary of paired-samples *t* test between the pre-test and post-test of vocabulary scores. The mean difference between the pretest and posttest was 21.70 (SD=11.02). Moreover, a comparison of the pretest and posttest indicated that there were statistically significant differences between these two tests (t=-11.65, df=34, p< 0.001). These 35 participants' vocabulary scores did improve significantly after the independent learning with their smartphones for one week.

Table 4.3 *Summary of Paired-Samples t Test between Pretest and Posttest of Vocabulary Scores*

	T	Df	Mean Difference	Std. Deviation	Sig. (2-tailed)
Pre-test Post-test	-11.65	34	-21.70	11.02	.000***

*Note. ***=statistically significant at the 0.001 level*

The mean scores of the pretest and posttest on vocabulary are 55.56 and 77.26, respectively. Besides, the mean score of the posttest was higher than that of the pretest by 21.70, which suggests that incidental acquisition occurred through this MALL activity.

4.2 Background Information, Listening Strategy Use, and Attitude

The online questionnaire (see Appendix F) was composed of four sections: (1) participants' background information, (2) participants' usages of listening strategies, (3) participants' attitude and perceptions of the smartphone-based listening task, and (4) other information.

4.2.1 Background Information

In this study there were 20 males and 15 females between 18–35 years old. 28 participants are still students, and 7 participants are non-students. All participants were required to have smartphones in order to take part in this study. However, not every one of them had free unlimited Internet access. About 37% of participants had free unlimited Internet access, but 63% of participants did not. Those who have unlimited Internet access might have more opportunities to use their smartphones for learning.

Figure 4.1 displays the percentages of the participants' different majors. The 28 students mentioned the majors that they're in now. Those 7 non-students revealed their majors when they were still students. These 35 participants represent 19 different majors, including Photonics (26%), Applied Chemistry (11%), Electrophysics (9%), Electronics Engineering (6%), Civil Engineering (6%), Communications Engineering (6%), Chinese Literature (3%), Business and Management (3%), NanoEngineering and MicroSystems (3%), Bioinformatics (3%), Technology Management (3%), Quantitative Finance (3%), Computer Science and Engineering (3%), Global MBA Program (3%), Material Science

and Engineering (3%), Electrical and Computer Engineering (3%), Physics (3%), Chemical Engineering (3%), and TESOL (3%).

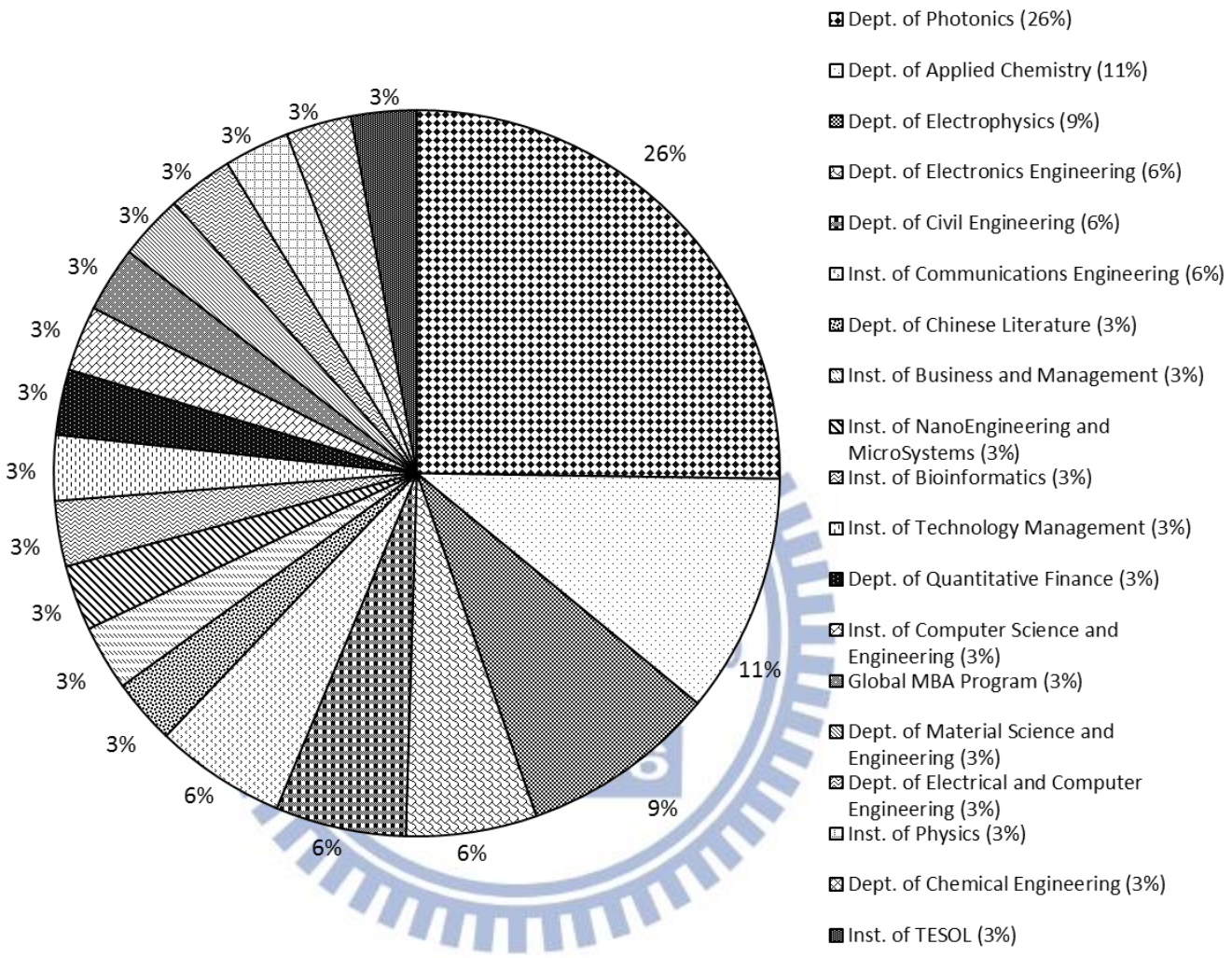


Figure 4.1 Percentages of Participants' Different Majors

Table 4.4 illustrates the participants' majors in greater detail. Most of the participants major in the field of natural subjects, and only some of them are in the field of social subjects. Among the 35 participants, nine major in Phonotics, four major in Applied Chemistry, and three major in Electrophysics. There are two participants in the

three majors of Electronics Engineering, Civil Engineering, and Communications Engineering, respectively. The remaining 13 participants are in these majors: Chinese Literature, Business and Management, NanoEngineering and MicroSystems, Bioinformatics, Technology Management, Quantitative Finance, Global MBA Program, Material Science and Engineering, Electrical and Computer Engineering, Physics, Chemical Engineering, and TESOL.

Table 4.4 *Participants' Educational Background*

ID	Major	N
No. 1	Dept. of Electronics Engineering	2
No. 17	Dept. of Electronics Engineering	
No. 2	Dept. of Chinese Literature	1
No. 3	Dept. of Photonics	9
No. 5	Dept. of Photonics	
No. 15	Dept. of Photonics	
No. 20	Dept. of Photonics	
No. 26	Dept. of Photonics	
No. 27	Dept. of Photonics	
No. 30	Dept. of Photonics	
No. 31	Dept. of Photonics	
No. 32	Dept. of Photonics	
No. 4	Dept. of Electrophysics	3
No. 21	Dept. of Electrophysics	
No. 29	Dept. of Electrophysics	
No. 6	Inst. of Business and Management	1

No. 7	Dept. of Applied Chemistry	4
No. 9	Dept. of Applied Chemistry	
No. 22	Dept. of Applied Chemistry	
No. 35	Dept. of Applied Chemistry	
No. 8	Inst. of NanoEngineering and MicroSystems	1
No. 10	Inst. of Bioinformatics	1
No. 11	Dept. of Civil Engineering	2
No. 14	Dept. of Civil Engineering	
No. 12	Inst. of Technology Management	1
No. 13	Dept. of Quantitative Finance	1
No. 16	Inst. of Communications Engineering	2
No. 23	Inst. of Communications Engineering	
No. 18	Inst. of Computer Science and Engineering	1
No. 19	Global MBA Program	1
No. 24	Dept. of Material Science and Engineering	1
No. 25	Dept. of Electrical and Computer Engineering	1
No. 28	Inst. of Physics	1
No. 33	Dept. of Chemical Engineering	1
No. 34	Inst. of TESOL	1

4.2.2 Listening Strategy Use

This section reports the listening strategies that participants used when watching TED Talks on their smartphones. Modified listening comprehension strategies, including metacognitive strategies and cognitive strategies, were adapted from Vandergrift's (1997)

study. The reliability for metacognitive and cognitive strategies was 0.73, which reached an acceptable reliability.

The results of the participants' usages of these listening strategies are shown in Table 4.5 and Table 4.6. Table 4.5 presents the results of participants' usages of metacognitive strategies from the five-point Likert scale online questionnaire, which participants answered with ratings from *Strongly agree* (a rating of 5) to *Strongly disagree* (a rating of 1). A rating at 4 or 5 points signifies that participants agreed with the statement and also implies that they used those metacognitive strategies while watching TED Talks on their smartphones. Among 11 metacognitive strategies, eight metacognitive strategies were recognized as highly used by most participants with the mean scores over three. These 8 metacognitive strategies consisted of Directed attention (M=4.0, SD= 0.91), Self-management-Concentration (M=3.80, SD=1.02), Strategy evaluation (M=3.51, SD=0.98), Performance evaluation (M=3.46, SD=1.15), Double-check monitoring (M=3.46, SD=1.34), Selective attention (M=3.17, SD=1.01), Problem identification (M=3.14, SD=1.29), and Self-management-Internet Disconnection (M=3.09, SD=1.48).

However, compared with the above eight strategies, the remaining three were less used by participants. They were subcategories of metacognitive strategies, including Advance organization-Time (M=2.97, SD=1.07), Comprehension monitoring (M=2.94, SD=1.02), and Advance organization-Goal (M=2.69, SD=1.11).

Table 4.5 *Participants' Usages of Metacognitive Strategies*

Metacognitive Strategies		1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	SD
Directed attention	1. I often focus on getting the main idea of the lectures instead of those unfamiliar words, phrases, and sentences.	2.9	2.9	14.3	51.4	28.6	4.0	0.91
Double-check monitoring	3. I often look at the subtitles while watching the lectures.	14.3	8.6	17.1	37.1	22.9	3.46	1.34
Advance organization-Time	5. I plan how to utilize my spare time to watch TED Talks.	8.6	22.9	40.0	20.0	8.6	2.97	1.07
Problem identification	6. When the lecture is over, I recall the problems (e.g. unstable Internet, other people's talking) I encountered when watching the lecture and then try to find some improvements (e.g. airplane mode, download lectures).	11.4	22.9	22.9	25.7	17.1	3.14	1.29
Advance organization-Goal	8. Before watching the lecture, I will set a goal in my mind and tried to achieve it.	11.4	40.0	22.9	20.0	5.7	2.69	1.11
Self-management-Concentration	11. In order to concentrate on learning, I would not use my smartphones to watch the lecture while doing other things.	0.0	14.3	20.0	37.1	28.6	3.80	1.02
Strategy evaluation	13. I would recall the techniques for English listening and evaluate their advantages and	2.9	11.4	31.4	40.0	14.3	3.51	0.98

	disadvantages.							
Metacognitive Strategies		1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	SD
Performance evaluation	17. When the lecture was over, I often think of my general listening comprehension.	11.4	5.7	20.0	51.4	11.4	3.46	1.15
Self-management-Internet Disconnection	19. I would download assigned lectures to avoid encountering Internet disconnection while watching TED Talks on smartphones.	17.1	25.7	14.3	17.1	25.7	3.09	1.48
Selective attention	20. I often focus on more difficult words, phrases, and sentences.	5.7	22.9	22.9	45.7	2.9	3.17	1.01
Comprehension monitoring	21. If I feel distracted (e.g. unstable Internet, phone calls) when watching the lectures, I would review the lecture again to make sure that I can understand it completely.	11.4	20.0	31.4	37.1	0.0	2.94	1.02

Note. N=35. Strongly Agree=5, Strongly Disagree=1

Table 4.6 offers the results for participants' usages of cognitive strategies. According to the five-point Likert scale online questionnaire, the mean scores over 3 were interpreted as that participants agreed with the statement. Out of 11 cognitive strategies, only two of them were less used by participants — namely Summarization (M=2.86, SD=1.19) and Translation (M=2.63, SD=1.33). The remaining nine subcategories of cognitive strategies were more frequently used. They include Imagery

(M=4.54, SD=0.56), Kinesic inferencing (M=4.29, SD=0.79), Between parts inferencing (M=4.23, SD=0.77), Voice and paralinguistic inferencing (M=4.20, SD=0.68), Academic elaboration (M=4.20, SD=0.76), Linguistic inferencing (M=4.06, SD=0.73), Deduction/induction (M=3.71, SD=1.10), Resourcing (M=3.69, SD=1.13), and Repetition (M=3.31, SD=1.08).

Table 4.6 *Participants' Usages of Cognitive Strategies*

Cognitive Strategies		1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	SD
Voice and paralinguistic inferencing	2. I often guess the messages the speakers are going to express by observing the tones and ways they used.	0.0	2.9	5.7	60.0	31.4	4.20	0.68
Between parts inferencing	4. I would guess the meaning of unfamiliar sentences from previous or next section of the context.	0.0	2.9	11.4	45.7	40.0	4.23	0.77
Translation	7. I would translate what speakers said into Chinese in mind.	22.9	34.3	8.6	25.7	8.6	2.63	1.33
Linguistic inferencing	9. I often guess the meaning of unfamiliar words by using other familiar words I know in the sentence.	0.0	2.9	14.3	57.1	25.4	4.06	0.73
Imagery	10. I would guess what speakers are talking about with pictures, music, or PowerPoint they used when delivering the speech.	0.0	0.0	2.9	40.0	57.1	4.54	0.56
Kinesic inferencing	12. I often guess the messages the speakers expressed through their	0.0	2.9	11.4	40.0	45.7	4.29	0.79

	body languages (facial expression, gestures, interaction between speakers and audience).							
Cognitive Strategies		1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	SD
Summarization	14. I would recall what the speakers said and make a brief summary when the lecture is over.	14.3	25.7	28.6	22.9	8.6	2.86	1.19
Deduction/ induction	15. I would guess the meaning of words by using morphological rules (e.g. stem, affix, suffix, part of speech) I learned before.	2.9	14.3	17.1	40.0	25.7	3.71	1.10
Academic elaboration	16. I try to understand the content of the lecture by utilizing related background knowledge.	0.0	2.9	11.4	48.6	37.1	4.20	0.76
Repetition	18. I would repeat or read silently the whole section or part of the speech (e.g. words, phrases, sentences).	5.7	17.1	28.6	37.1	11.4	3.31	1.08
Resourcing	22. I would use dictionary or subtitles within the App or other recourses to make myself understand the lecture.	5.7	11.4	14.3	45.7	22.9	3.69	1.13

Note. N=35. Strongly Agree=5, Strongly Disagree=1

4.2.3 Attitudes of MALL Activity

A modified questionnaire of Davis' (1989) Technology Acceptance Model TAM was invented by the researcher to investigate participants' attitudes and perceptions toward this MALL activity. A five-point Likert scale was utilized and consisted of three sections: (1) Usability, (2) Effectiveness, and (3) Satisfaction. The reliability for participants' attitudes and perceptions was 0.92, which indicated a very high reliability.

Table 4.7 provides the percentages of usability of smartphone-based English learning that participants' perceived. In general, most of the participants had a positive attitude toward the usability of this MALL activity with more than 3.0 mean scores. Among these four items, they agreed with the first item the most (M=4.11, SD=0.87), which was about the usability of instructions and steps of using smartphones for English learning, followed by the ease of smartphone app use (M=3.97, SD=0.95), encountering any difficulty (M=3.63, SD=1.22), and design of smartphone app (M=3.57, SD=1.01).

Table 4.7 *Percentages of Usability*

Usability	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	SD
1. It is quite easy to follow the instructions and steps of using smartphones for English learning.	0.0	5.7	14.3	42.9	37.1	4.11	0.87
4. The smartphone APP made me learning English with ease.	2.9	5.7	11.4	51.4	28.6	3.97	0.95
8. The design of smartphone APP is user- friendly.	5.7	5.7	28.6	45.7	14.3	3.57	1.01
12. Generally, I had no difficulty using smartphones to learn English.	2.9	22.9	11.4	34.3	28.6	3.63	1.22

Note. N=35. Strongly Agree=5, Strongly Disagree=1

Table 4.8 presents the percentages of effectiveness of smartphone-based English learning that participants agreed with. On the five-point Likert scale, the mean of each item received more than three points, which implied that most of the participants agreed that this MALL activity was effective. Among the four items, the one that participants agreed with the most was the convenience of the smartphone, so learners could use it to learn English anywhere and anytime easily (M=4.03, SD=0.89). The second highest mean score came to the efficiency of using a smartphone for English learning (M=3.51, SD=0.58), followed by self-control of the English learning process (M=3.34, SD=0.97), and using spare time effectively with smartphones for English learning (M=3.20, SD=1.05).

Table 4.8 *Percentages of Effectiveness*

Effectiveness	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	SD
2. Smartphones made it easy for me to learn English anywhere and anytime.	2.9	0.0	20.0	45.7	31.4	4.03	0.89
5. With smartphones, I could control the process of self-learning of English.	5.7	5.7	48.6	28.6	11.4	3.34	0.97
6. I could use smartphones to learn English efficiently.	2.9	2.9	45.7	37.1	11.4	3.51	0.85
9. I would use smartphones effectively to learn English in my spare time.	2.9	28.6	22.9	37.1	8.6	3.20	1.05

Note. N=35. Strongly Agree=5, Strongly Disagree=1

Table 4.9 displays the percentages of participants' perceived satisfaction with smartphone-based English learning. Out of five points, each item received more than

three points on average, which implied that most participants were satisfied with this MALL activity. The mean scores of these four items were 3.69 on continuing using smartphones for English learning, 3.60 on recommending other people to use smartphones to learn English, 3.60 on being satisfied with this MALL activity generally, and 3.57 on having interest in watching video clips.

Table 4.9 *Percentages of Satisfaction*

Satisfaction	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	SD
3. I would like to continue using smartphones to learn English.	2.9	8.6	28.6	37.1	22.9	3.69	1.02
7. I would like to recommend other people to use smartphones to learn English.	2.9	8.6	34.3	34.3	20.0	3.60	1.01
10. In general, I was satisfied with smartphone-based English learning.	2.9	2.9	42.9	34.3	17.1	3.60	0.91
11. I found it interesting to watch video clips for English learning through smartphones.	5.7	5.7	31.4	40.0	17.1	3.57	1.04

Note. N=35. Strongly Agree=5, Strongly Disagree=1

4.2.4 Other Information

In this section, other information about participants' self-learning behavior is presented. None of the 35 participants had ever watched the three assigned video clips from TED Talks before, since the assigned video clips were only posted recently around the end of 2013 and the beginning of 2014.

Regarding the situation for the self-learning of English with smartphones within one week (see Figure 4.2), most (about 39%) participants reported that they often used their

smartphones to watch the assigned video clips before going to bed; some (about 21%) would use their smartphones to learn while waiting; others (about 12 %) would use it while eating or when he or she stayed in a quiet place such as his or her own room; still others (about 11%) would use it during break between classes. The remainder (5%) would use it while doing other things such as walking or doing assignments.

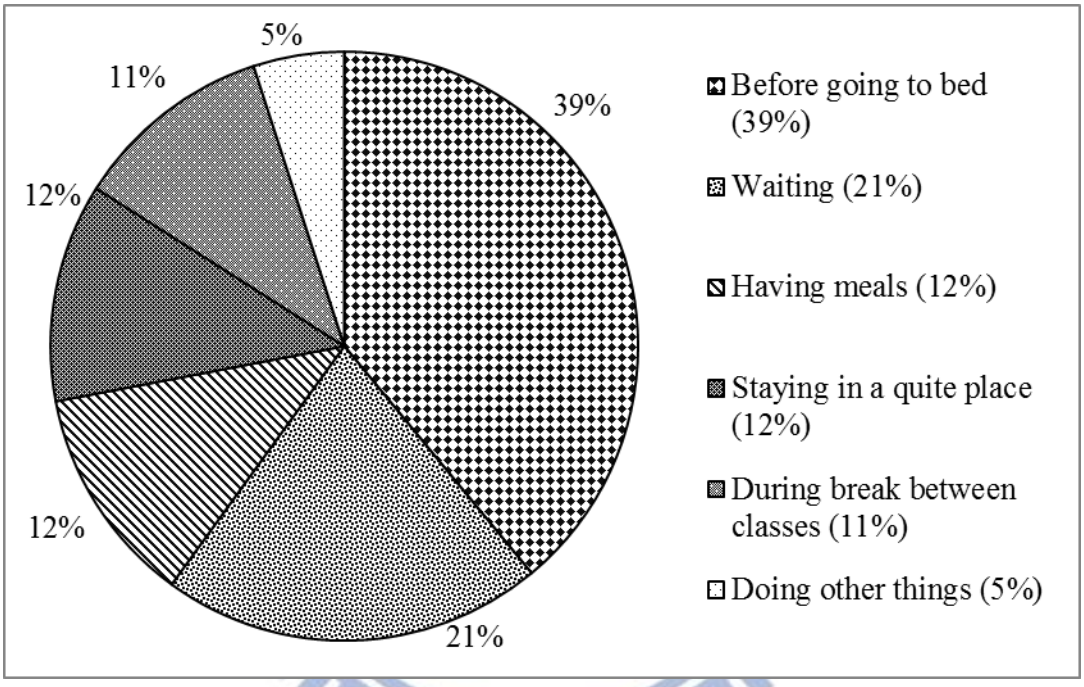


Figure 4.2 Percentages of Participants' Different Situations for Using Smartphones

Figure 4.3 shows the results of the times that participants used their smartphones to watch assigned TED Talks in one day. Most (about 86%) participants used it less than two times, some (about 11%) used it two or three times a day, and only about 3% used it three to five times within one day.

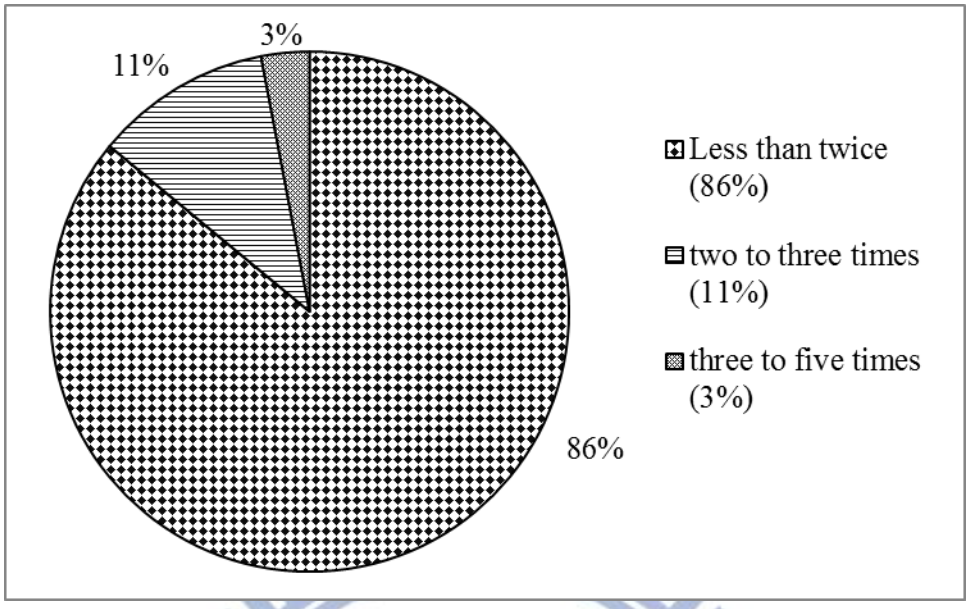


Figure 4.3 Percentages of Times for Watching TED Talk with Smartphones in One Day

As for the amount of time that the participants would spend whenever they used their smartphones to learn English (see Figure 4.4), the results show that about 63% of participants spent only half an hour, and the rest (37%) reported that it took them about one hour each time they used their smartphones.

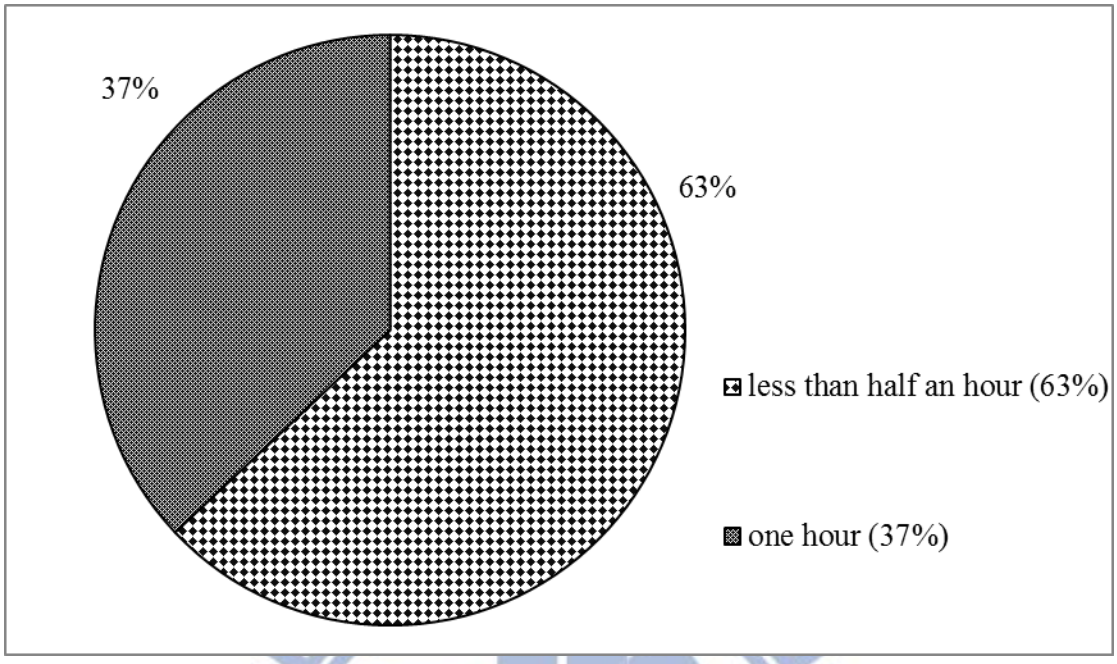


Figure 4.4 Percentages of Time that Participants Spent Every Time They Used

In the last section of the online questionnaire, 35 participants were asked whether they would like to have a short interview on their listening strategy use and perceptions of MALL activity. Out of 35 participants, 20 (about 57%) agreed to be interviewed for 10 minutes, but the other 15 (about 43%) did not want to share their opinions.

4.3 The Relationship between Listening Strategy Use and Incidental Vocabulary Acquisition

This section focuses on the relationship between participants' listening strategy use and their incidental vocabulary acquisition. This study adapted Paribakht and Wesche's (1997) and Vidal's (2003) VKS as the vocabulary measurement, and a five-point Likert scale online questionnaire was also utilized to explore participants' listening strategy use. The section presents a statistical analysis of the relationship between participants' vocabulary gains and their listening strategy use.

A Pearson correlation coefficient procedure was applied to determine whether a linear relation exists between these two variables. Table 4.10 offers the results of the participants' metacognitive listening strategy use and vocabulary differences. Among 11 metacognitive strategies, only Directed attention ($r=-0.398$, $p=0.018$) and Strategy evaluation ($r=0.361$, $p=0.033$) were statistically significant when correlated with vocabulary differences at the 0.05 level.

The statistical results from Table 4.10 imply that most of the listening strategies that participants used were not significantly related to their vocabulary differences. However, the relationship between the listening strategy use of Directed attention and vocabulary differences, and between the listening strategy use of Strategy evaluation and vocabulary differences, were statistically significant. Participants who used strategy evaluation frequently would perform better on the vocabulary test. In other words, their vocabulary differences could result from their use of strategy evaluation. However, the more they used directed attention, the lower vocabulary scores they would get.

Table 4.10 *Correlation between Metacognitive Strategy Use and Vocabulary Differences*

Metacognitive strategy		Vocabulary Differences
Directed attention	Pearson Correlation	-.398*
	Sig. (2-tailed)	.018
	N	35
Double-check monitoring	Pearson Correlation	-.084
	Sig. (2-tailed)	.630
	N	35
Advance organization-Time	Pearson Correlation	.224
	Sig. (2-tailed)	.197
	N	35
Problem identification	Pearson Correlation	-.123
	Sig. (2-tailed)	.480
	N	35
Advance organization-Goal	Pearson Correlation	.218
	Sig. (2-tailed)	.209
	N	35
Self-management-Concentration	Pearson Correlation	-.073
	Sig. (2-tailed)	.676
	N	35
Strategy evaluation	Pearson Correlation	.361*
	Sig. (2-tailed)	.033
	N	35
Performance evaluation	Pearson Correlation	.185
	Sig. (2-tailed)	.288
	N	35
Self-management-Internet Disconnection	Pearson Correlation	.038
	Sig. (2-tailed)	.830
	N	35
Selective attention	Pearson Correlation	.282
	Sig. (2-tailed)	.100
	N	35
Comprehension monitoring	Pearson Correlation	.159
	Sig. (2-tailed)	.360
	N	35

*Note. *=statistically significant at the 0.05 level*

Table 4.11 shows the results of participants' cognitive listening strategy use and their vocabulary differences. As the table indicates, the correlation between these two variables was not statistically significant at the 0.05 level.

Table 4.11 *Correlation between Cognitive Strategy Use and Vocabulary Differences*

Cognitive strategy		Vocabulary Differences
Voice and paralinguistic inferencing	Pearson Correlation Sig. (2-tailed) N	-.019 .912 35
Between parts inferencing	Pearson Correlation Sig. (2-tailed) N	.136 .434 35
Translation	Pearson Correlation Sig. (2-tailed) N	.086 .621 35
Linguistic inferencing	Pearson Correlation Sig. (2-tailed) N	.037 .832 35
Imagery	Pearson Correlation Sig. (2-tailed) N	.287 .095 35
Kinesic inferencing	Pearson Correlation Sig. (2-tailed) N	.152 .383 35
Summarization	Pearson Correlation Sig. (2-tailed) N	.214 .217 35
Deduction/induction	Pearson Correlation Sig. (2-tailed) N	.211 .224 35
Academic elaboration	Pearson Correlation Sig. (2-tailed) N	.088 .614 35

Cognitive strategy		Vocabulary Differences
Repetition	Pearson Correlation Sig. (2-tailed) N	.240 .166 35
Resourcing	Pearson Correlation Sig. (2-tailed) N	.013 .939 35

4.4 Semi-structured Interview

After finishing the experiment and an online questionnaire, 15 participants agreed to take part in a 10-minute interview, which consisted of two sections. First, all interviewees were asked to briefly demonstrate how they used their smartphones to watch the assigned TED Talks for recalling memories. In the second section, they were asked several questions about their listening strategy use and their attitude toward MALL based on their responses to the online questionnaire.

According to the participants' responses to the five-point Likert scale online questionnaire, 15 of them were asked several questions in the 10-minute semi-structured interview. There were four parts of questions: (1) questions for every interviewee (those mean scores were less than three), (2) questions for individuals (those who gave less than three points on certain questions), (3) an open-ended question about other listening strategy use, and (4) a final question about advantages and disadvantages of this MALL activity (see Appendix G).

4.4.1 Interviewee's Personal Information

Table 4.12 illustrates 15 interviewees' background information, their TOEFL listening scores, and their vocabulary scores. As shown below, all participants were ranked based on their TOEFL listening scores and their vocabulary scores. An interesting result was found that No. 35, who got the highest score on the TOEFL listening test, was only ranked as the 21st based on the vocabulary score. On the other hand, although No. 3 got the lowest score on the TOEFL listening test, he got the highest score on the vocabulary test. It appears that one who got high scores on the TOEFL listening test wouldn't be guaranteed to get high scores on the vocabulary test. To figure out the reasons for this, the following section presents the ways of the participants' learning behaviors on smartphones and the reasons behind their learning behaviors, based on the results of the interviews.

Table 4.12 *The Descriptions of Volunteer Interviewees*

Group	ID	Major	Scores and Rank of TOEFL Listening Test	Scores and Rank of Vocabulary Test (Posttest-Pretest)
High (22-30)	No. 35	Dept. of Applied Chemistry	27 (1^{st})	18 (21^{th})
	No. 15	Dept. of Photonics	26 (3^{rd})	26 (10^{th})
	No. 34	Inst. of TESOL	25 (4^{th})	13 (26^{th})
	No. 21	Dept. of Electrophysics	22 (6^{th})	17 (24^{th})
Intermediate (15-21)	No. 10	Inst. of Bioinformatics	20 (9^{th})	32.5 (6^{th})
	No. 11	Dept. of Civil Engineering	20 (9^{th})	22 (14^{th})
	No. 22	Dept. of Applied Chemistry	20 (9^{th})	34 (5^{th})
	No. 24	Dept. of Material Science and	18 (14^{th})	17.5 (22^{th})

	No. 14	Engineering Dept. of Quantitative Finance	17 (15th)	40.5 (2nd)
	No. 31	Dept. of Photonics	16 (17th)	12 (29th)
	No. 8	Inst. of NanoEngineering and MicroSystems	15 (20th)	17 (24th)
Low (0-14)	No. 6	Inst. of Business and Management	14 (25th)	9 (32th)
	No. 23	Inst. of Communications Engineering	14 (25th)	12.5 (28th)
	No. 20	Dept. of Photonics	13 (29th)	20.5 (17th)
	No. 3	Dept. of Photonics	11 (35th)	57 (1st)

4.4.2 Demonstration of MALL Activity

Participants were first required to briefly demonstrate how they used their smartphones to watch the assigned video clips. In order to not occupy the storage space of their smartphone, some of the participants preferred using the "search" function with the speaker's name or topic names to locate the assigned TED Talks (see Figure 4.5).

Figure 4.5 The Screenshot of Searching for Assigned TED Talks

However, other participants replied that some places would not always offer them stable wireless Internet connection, so they would download the assigned TED Talks on their smartphones in advance (see Figure 4.6).

Figure 4.6 The Screenshot of Downloading Assigned TED Talks

Still other participants would use the "bookmark" function. With this function, they didn't need to worry that the storage space of their smartphones would be occupied because of downloading, and they could easily locate the three assigned TED Talks (see Figure 4.7).

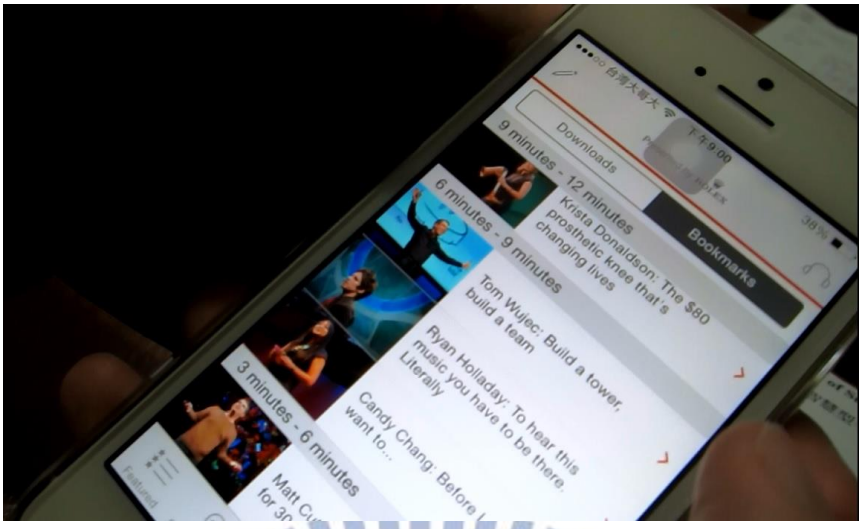


Figure 4.7 The Screenshot of Bookmarking Some TED Talks in My Talks

No matter which function participants used, once they successfully located the assigned TED Talks, there were two versions to choose: audio or video. If they only wanted to hear the sound, they clicked "Listen to audio". They could also click the picture on the top to watch the video clips (see Figure 4.8).

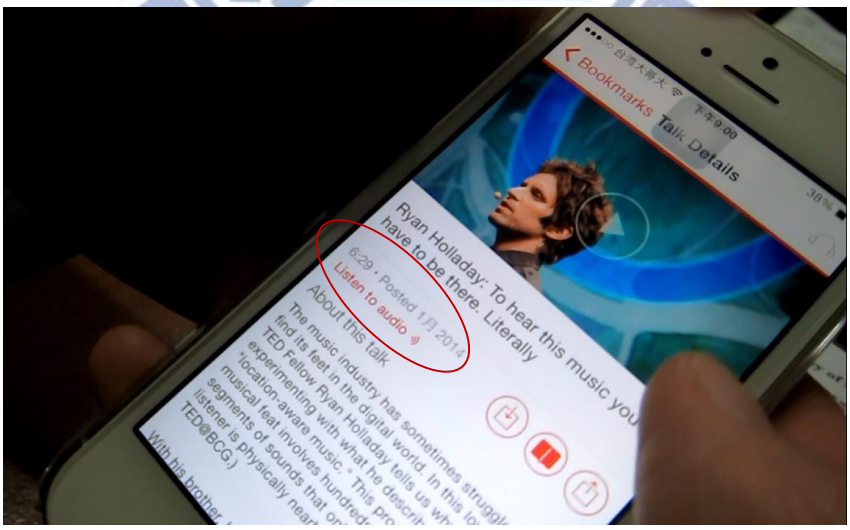


Figure 4.8 Screenshot of Choosing Audio/Video of TED Talks

Before watching the video clip, some participants would turn off subtitles, but others would choose subtitle languages. There were plenty of languages for participants to choose from, such as English and traditional Chinese, which were chosen frequently (see Figure 4.9).

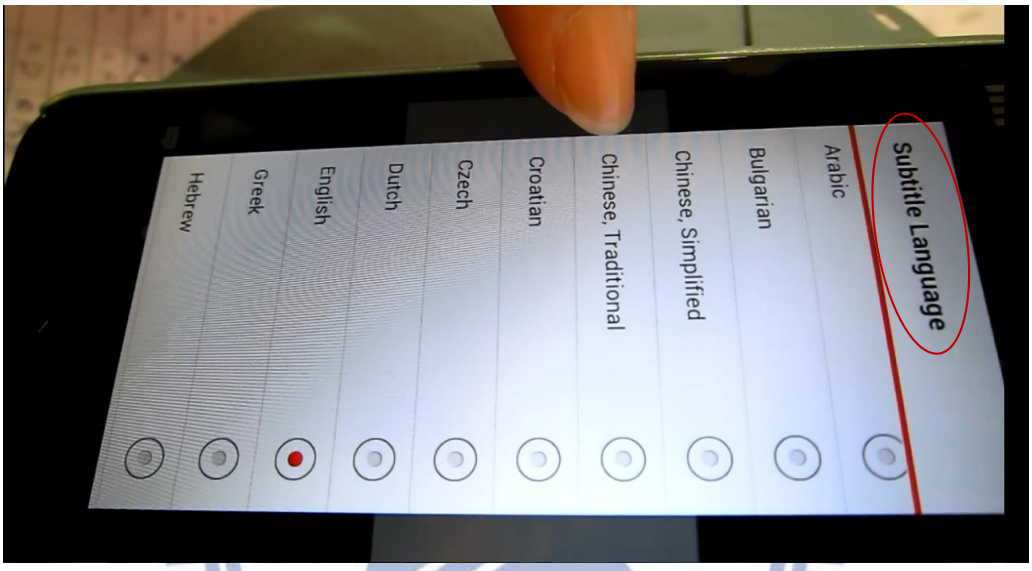


Figure 4.9 The Screenshot of Choosing Subtitles

4.4.3 Interview Questions on Listening Strategy

As for listening strategy, participants were asked how they used metacognitive strategy and cognitive strategy while watching the video clips with their smartphones. In this section, participants' elaborations on metacognitive strategy, taken from the interviews, are provided, followed by those on cognitive strategy.

A. Metacognitive Strategy

Among 11 metacognitive strategies, most of the mean scores were above three out of five points. However, the means of the three metacognitive strategies received less than three points, and they were Advanced organization-Time (Mean=2.97, SD=1.07), Comprehension monitoring (Mean=2.94, SD=1.02), and Advanced organization-Goal (Mean=2.69, SD=1.11). The researcher elicited some elaborations from the interview as shown below.

a. Advance organization-Time

Participants revealed that their infrequent use of Advance organization-Time was due to three main reasons: (a) personal living or learning style, (b) shortness of time segments, and (c) taking a long time for the assigned TED Talks.

(a) Personal living/learning style

Most participants mentioned that smartphone-based English learning is new to them, so they didn't have a plan for how to use it. For example, No. 15's explained:

> *I have never thought of planning how to do this in advance because I just used it whenever I had small pockets of time* [No. 15].

Other participants said their personal living or learning styles made them use this strategy less. For example, No. 24 mentioned in her interview that she didn't plan to use her smartphone to learn because she often had her computer with her.

Well, I didn't have too much small pockets of time; if I did, I often stayed in the dorm or the laboratory where I had my computer as well. Then I would like to use my computer since the wireless Internet was unstable for me to use the smartphone at those places [No. 24].

In addition to students, those non-students mentioned that they barely found time to use their smartphones to learn English, let alone plan how to use it. No. 3 in his interview elaborated on this.

I was busy at work during day time and barely had time pockets, so I didn't plan to use it. I always watched the video clip at home after work [No. 3].

Similarly, some students didn't plan to use small segments of time to do this because it was hard to concentrate on watching TED Talks during that short period of time, as No. 21 said in her interview.

I would not like to use pockets of time to watch these assigned video clips because I wanted to concentrate on the lecture. I used full time to watch them [No. 21].

On the other hand, two participants planned how to use that short amount of time because of specific situations. No. 20 for example, said he would make some plans in advance because of his fixed schedule.

Yes, I usually planned how to take advantage of small pockets of time. Since I worked at school and I had almost the same schedule, so I could know when and how long pockets time I would have in advance [No. 20].

Additionally, No. 34 mentioned the Internet problem she encountered and the solution she found by planning to use her smartphone in the workplace.

> *Because the wireless Internet in my place was unstable, I would plan to use time pockets to watch the video clips during lunch time when I was in the company. The Internet there was much more stable* [No. 34].

(b) Time segments were short

Some participants said that time segments usually were short and they could not know exactly when or how long they would have small amounts of time, so it was hard to plan how to use that time beforehand. For instance, No. 10 stated her opinion as follows:

> *I would not plan to use my smartphone to watch TED Talks since the small pockets of time is too short. It was nearly impossible to plan in advance how to use that short time, which occurred to me suddenly* [No. 10].

(c) The assigned TED Talks were long

The duration of each video clip was only about ten minutes, but it was so long for some participants that they could not finish watching it within the amounts of time they had. For example, No. 13 mentioned in her interview that breaks between classes were not long enough for her to watch video clips.

> *To me, using time pockets such as breaks between classes to watch video clips might not be suitable because I need more time to watch video clips. I*

think…using break time to learn some vocabulary words might be more efficient [No. 13].

b. Comprehension monitoring

In addition to Advanced organization-Time, another infrequently used metacognitive strategy was Comprehension monitoring. The main reasons for this were (a) personal learning style and (b) no distractions.

(a) Personal learning style

More than half of the participants would not watch the video clip from the beginning after they were distracted because of their personal learning style. For example, No. 8 shared his opinion:

I would go back to the part that I was distracted last time. But, I didn't watch it from the beginning [No. 8].

No. 34 also indicated that the distractions she encountered often didn't take her a long time to fix, so she would just pause the video and then continue watching.

After I was distracted, I would just move on since the distraction didn't take me too much time to fix it and I could still remember what the speaker said [No. 34].

(b) No distractions

Interestingly, No. 6 revealed her reason for not using this strategy was because she didn't encounter any distraction.

I didn't have that experience because I usually watched the video clips in the late night before going to bed [No. 6].

On the other hand, No. 24 emphasized that he would go back to the beginning if he was interested in the video clip.

When I was distracted, I would stop and do other things. If I was interested in that video clip, I would find other time to watch it from the beginning again [No. 24].

c. Advanced organization-Goal

The other less frequently used metacognitive strategy was Advanced organization-Goal. When asked about their infrequent use of this strategy, many participants stated that the main reason lies in different personal learning styles.

Personal learning style

Most participants had never thought of setting objectives before they started to watch a video. For example, No. 22 shared his opinion as follows:

Probably not! I didn't think too much before I watched the video clips [No. 22].

Though most participants would not set objectives at the first time, they started to do this from the second time they watched video clips. For instance, No. 11 described how he set up objectives in the statement below:

Well, I didn't think of this before I started to watch video clips at the first time. But, I would plan to pay more attention to the words that I couldn't understand after I watched the video clips at the first time, and then I tried to figure them out

from the context next time. Sometimes I would look up some words that I couldn't figure out from the context [No. 11].

However, few participants would set objectives for watching the video clips because they wanted to enhance learning efficiency or when they were interested in certain themes of the lecture.

(a) Learning efficiency

No. 23 mentioned in his interview that he would do this in order to increase learning efficiency.

Yeah, I would think of the learning objective, but I seldom achieved it. When watching the video clips, my top priority was to use as little time as possible but benefit from it the most [No. 23].

(b) Theme of the lecture

Another participant indicated that whether she would do this depended on the theme of the lecture. For example, No. 10 shared her experience of setting objectives.

If I'm interested in the theme of the lecture, I will definitely plan how to watch next time. For example, I like the third video clip about biology, I would try to get the main idea the first time. Then, I would plan how to get more details of the lecture next time [No. 10].

d. Problem identification

In addition to the three less frequently used metacognitive strategies noted above, there was one more interesting finding of Problem identification strategy. No. 13 shared her experience of dealing with distractions by changing the setting of her smartphone while watching the video clip.

> *Since I downloaded assigned TED Talks, I wasn't distracted by unstable Internet. But sometimes I felt distracted by other smartphone apps such as LINE. Once someone sent me a message, the video clip would pause. After it happened to me several times, now I will switch my setting of smartphone to "Do not disturb mode"* (see Figure 4.10 "勿擾模式") *while watching video clips through the smartphone. Except for phone calls, this mode could prevent me from getting any message from app such as LINE or Facebook* [No. 13].

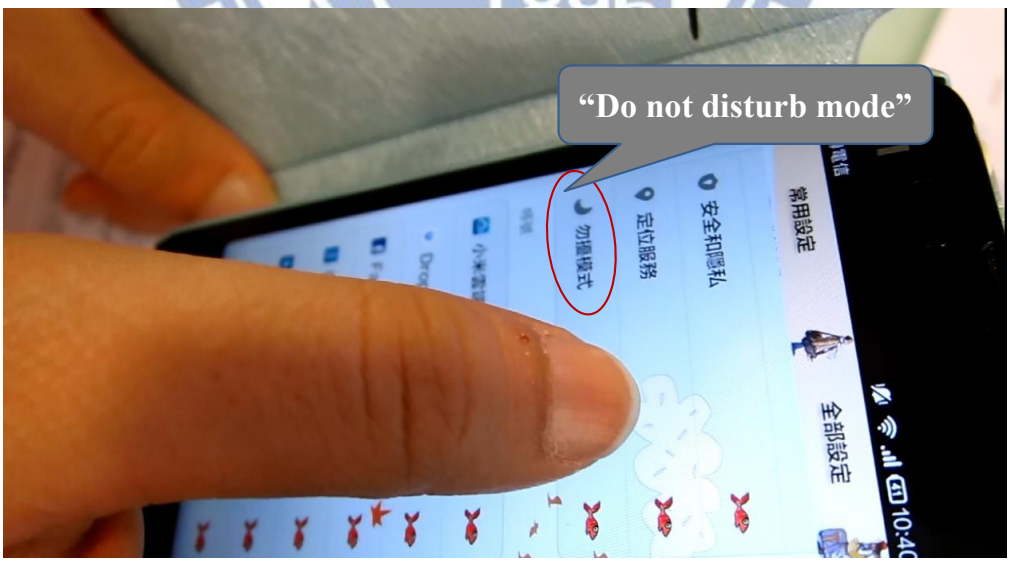


Figure 4.10 The Screenshot of Switching to "Do not disturb mode"

B. Cognitive Strategy

Among 11 cognitive strategies, mean scores of half of these cognitive strategies were more than three points on a five-point Likert scale. Only two cognitive strategies received less than three points on mean scores, and they were Summarization (Mean=2.86, SD=1.19) and Translation (Mean=2.63, SD=1.33). The 15 volunteer interviewees were asked to elaborate on these two cognitive strategies.

a. Summarization

Participants revealed that their infrequent use of Summarization was due to: (a) personal living or learning style, (b) the theme of the lecture, and (c) shortness of time segments.

(a) Personal learning style

Some participants mentioned that different learning styles could be the reason that they would not summarize after watching the video clips. For example, No.10 in her interview shared the following opinion:

> *I would only recall what the speaker said, but I would not make a summary too seriously with many details* [No. 10].

Some would do brief summary, but they would not write it down, as No. 34 said in her interview.

> *I would not write the summary down on a piece of paper, but I would do it in my mind briefly* [No. 34].

In terms of the situation for doing a summary, No. 3 mentioned that he only did this the second time that he watched a video clip.

> *I would not always do this every time. I probably did this after the second time I watched the video clip since I was busy learning some words in the first time* [No. 3].

Moreover, No. 6 said that she would not do a summary because she treated this MALL activity as entertainment.

> *I just enjoyed watching the video clips in a very relaxed way. I didn't feel like doing a summary, but I was inspired by the lectures* [No. 6].

(b) The theme of the lecture

Being asked whether to do the summary or not, No. 24 revealed that he would do this if he was interested in the video clip.

> *It really depends on the theme of video clips. If I have no interest in this video, I won't recall the lecture. So I don't always do this* [No. 24].

(c) Shortness of time segments

When asked about the reason for not doing a summary after a video clip was over, No. 23 explained that time segments were too short to do that.

> *Since I watched the video clip in small pockets of time, there was not so much time for me to do this. All I would do was briefly recall the part that I couldn't comprehend* [No. 23].

b. Translation

Another less frequently used cognitive strategy was Translation. The reasons for its infrequent use could be (a) personal learning style and (b) the speaker talking too fast.

(a) Personal learning style

Most participants did not want to do a translation while watching the video clips because of their different learning styles. For example, No. 35 reasoned:

> *When I was watching TED Talks, I would not consciously translate what I heard into Chinese. It was not my learning style. Most of the time I just comprehend the lecture directly from the target language — English* [No.35].

Moreover, some would use Chinese subtitles so that there was no need to translate English into Chinese. In his interview, No. 31 elaborated on this.

> *I used Chinese subtitles when watching the video clip, so I didn't need to do a translation* [No. 31].

Although some participants would not do a translation, there were still some who would do a translation due to their personal learning styles. For example, No. 13 shared her experiences of doing translations since high school.

> *Yes, I've been doing this since high school. Once the speaker said a sentence, I would immediately translate some key words, not the whole sentence* [No. 13].

Similarly, though some participants felt distracted by translations, others confirmed the merit of doing translation. No. 3 explained his motivation to do this.

Yes, I would do this because it helped me understand the lecture more [No. 3].

(b) The speaker's talking too fast

To some participants, the speakers in the videos talked so fast that they did not have enough time to do a translation. No. 10 revealed her reason for not using this strategy.

Well, I didn't do this because the speaker talked too fast. Besides, I could only concentrate on listening to the lecture at that time [No. 10].

C. Other listening comprehension strategy

During the one week of independent learning with smartphones, some participants developed three main listening strategies to enhance their comprehension.

a. Smartphone-based learning with a computer

Some participants revealed that they would use computers to assist them while they were using smartphones to watch the video clips. For example, No. 20 said that using a computer to look up certain words would help him understand the meaning of unfamiliar words.

If I found some words that I was interested in, I would write them down and used my computer to look them up. Besides, I also downloaded the software called "Dr. Eye," which is a kind of online dictionary on my computer. When I used my computer to review a transcript, I used it to help me look up words quickly [No. 20].

b. Smartphone-based learning with earphones

Some participants stated that they would use earphones to watch the video clips in public in order to help them concentrate. Another reason was that they were afraid other people would be distracted by the sound. For example, No. 31 emphasized that his speaker was at the back of his smartphone, which made other people hear the sound easily.

> *The speaker of my smartphone was at the back* (see Figure 4.11)*, which could make lots of noise, so I definitely would need to bring earphones with me if I wanted to watch the video clip in public* [No. 31].

Figure 4.11 The Screenshot of the Speaker at the Back of Smartphones

c. Smartphone-based learning with subtitles

In the MALL activity, participants were developing learning autonomy during the week for independent learning. For instance, they could choose whether to turn on/off subtitle and even the languages of subtitle. Some people took advantage of this function by choosing different language each time to find out which one help them the most. Take No. 13 for example, she would try different modes of subtitle to find out which worked for her. So, she would watch every video clip at least three times. The reasons of doing this are depicted below.

> *In the first time, I would turn off the subtitles, and then I would guess what the speakers said by observing the PPT he or she used. Most of the time, I could understand it, but the one talking about biology was more difficult to me. Then, I would switch to Chinese subtitle to watch in the second time. After that, I would switch to English subtitle to find out certain key words in the third time [No. 13].*

In addition to watching the video clip three times with different modes of subtitle, No. 20 mentioned that he would switch to different languages of subtitle back and forth in the middle of the video clip.

> *Because my English was not good enough, I always used Chinese subtitle to watch the assigned video clip. If I found something interesting, I would switch to English subtitle for a while, and then switch back to Chinese subtitle [No. 20].*

4.4.4 Interview Questions on Attitude toward MALL Activity

In 10-minute interviews, 15 participants were asked about their attitudes toward this smartphone-based listening practice on three aspects: (1) Usability, (2) Effectiveness, and (3) Satisfaction. There were four questions for each aspect. Each aspect received at least three points on the mean, which indicate that most of the participants had a positive attitude toward this MALL activity.

A. Usability

Only a few participants disagreed with some of the statements under the aspect of usability. Talking about encountering any difficulty in question 12, participant No. 11 mentioned that unstable wireless Internet connection prevented him from using his smartphone for watching the video clips.

> *The most difficult problem that I encountered was the wireless Internet, so it was impossible for me to use my smartphone to watch the video clip in that situation* [No. 11].

B. Effectiveness

As for effectiveness, not every participant agreed that he or she could make good use of small amounts of time for smartphone-based English learning in question No. 9. For example, participant No. 21 and No. 11 explained that they could not take good advantage of available time segments due to personal learning style and lack of earphones.

a. Personal learning style

> *To me, I haven't tried using my smartphone to learn English before, so I didn't think of making good use of pockets of time to watch the video clip with smartphones* [No. 21].

b. Lack of earphones

> *I didn't think smartphone-based English learning helped me make good use of small pockets of time too much because I rarely had my earphones with me, which I would definitively need in public* [No. 11].

C. Satisfaction

Owing to different personal learning styles and lack of earphones, No. 21 and No. 15 revealed in question No. 3 that they would not continue using smartphones for English learning.

a. Personal learning style

> *I'm still a student now, so I often stay in the dorm where I could use my computer. So I thought the living style made me have less chance to use the smartphone to learn* [No. 21].

b. Lack of earphones

> *I don't feel like using my smartphone to watch the video clip for English learning since I also need to bring another device — earphones. Otherwise, I'm afraid that the sound might bother other people or it was hard to concentrate* [No. 15].

4.4.5 Advantages and Disadvantages of MALL Activity

Participants were also required to provide one advantage and one disadvantage of MALL activity. Generally, they mentioned two main advantages and several disadvantages.

A. Advantages

In the aspect of advantage, most participants mentioned smartphones' easy carrying, followed by the sophisticated design of TED App.

a. Easy to carry around

For example, No. 15 and No. 6 explained the reasons for easy carrying as follows:

> *Smartphones are easy to carry around. I could still use my smartphone to watch video clips in the small pockets of time* [No. 15].

> *It was easy to carry my smartphone around, so I could watch the video clips in a very casual way, which made me feel very relaxed* [No. 6].

b. Sophisticated Design of Smartphone App

Moreover, No. 22, No. 10, and No. 35 shared their learning experiences with smartphones in terms of the sophisticated design of this TED app.

> *Compared with the computer, it is more convenient to watch video clips on the smartphone because all I need to do is turn on the TED app. If I watch them on*

my computer, I need to turn on the computer and search for the TED website, which needs more steps [No. 22].

I always have my smartphone with me, so it's convenient to use it to learn in my spare time. When I used it to learn, it helped me concentrate because I could only turn on one smartphone app at the time. I could not do other things such as chatting on Facebook while watching video clips at the same time [No. 10].

I could save my time by listening to the lecture and doing other assignments at the same time [No. 35].

B. Disadvantages

Some participants also mentioned several disadvantages: (1) Small screen, (2) Unstable wireless Internet, and (3) Lack of earphones.

a. Small screen

Most were upset about the small screen of their smartphone (see Figure 4.12) while watching the video clip.

The screen is too small, so I could only use it for a while. Otherwise, my eyes would feel uncomfortable [No. 31].

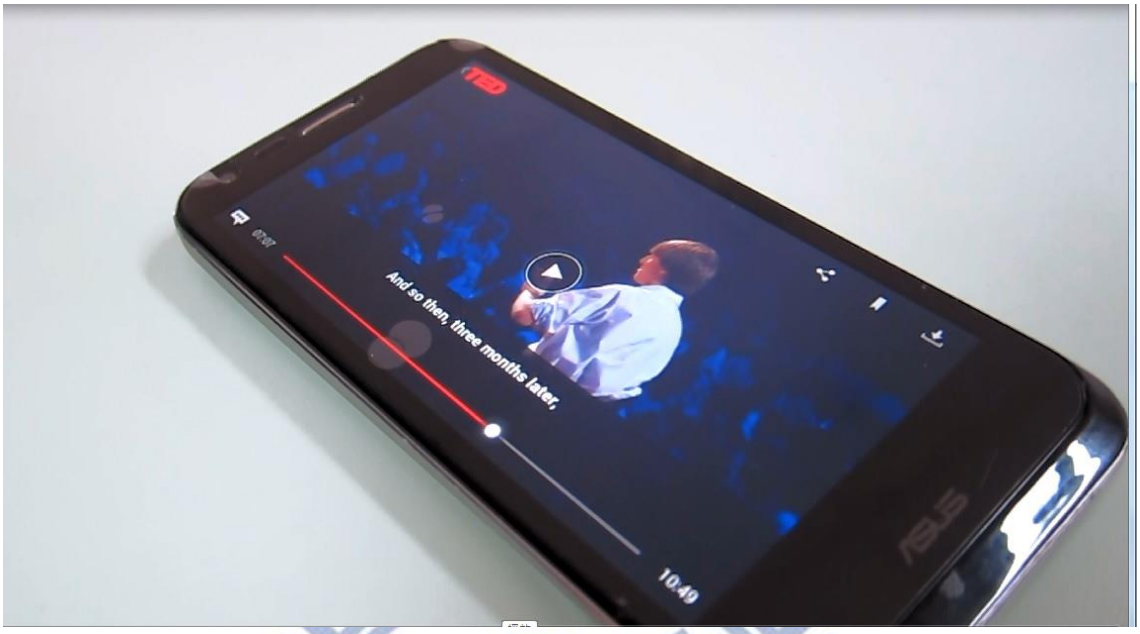


Figure 4.12 The Screenshot of Full Screen Function on Smartphones

b. Unstable wireless Internet

To those who didn't have unlimited Internet to use, they relied on public Internet such as at school or at work. However, if the wireless Internet was unstable, then it would prevent them from using smartphones to learn. That's why No. 34 said the Internet could be both an advantage and a disadvantage for mobile-based learning.

> *To me, the biggest advantage of the smartphone is also the biggest disadvantage. That is, the Internet problem* [No. 34].

c. Lack of earphones

Many participants noted that it was hard for them to watch the video clips outside if they didn't have earphones with them. For example, No. 11 reveals his reasons as follows:

In order not to bother other people, if I used my smartphone to watch the video clip, I also needed to have earphones with me, which I would feel as an inconvenience [No. 11].

Few participants stated that they preferred not to use their smartphones to learn when they were outside because it was too noisy. It was impossible to learn with their smartphones if they don't have earphones outside.

I would use pockets of time searching video clips that I might have interest in, and then watched them at home since it was often very noisy outside and I didn't have earphones. So I didn't think that smartphones could help me learn efficiently when I stayed outside [No. 3].

CHAPTER FIVE

DISCUSSION AND CONCLUSION

The aims of this study were to explore EFL adult learners' incidental vocabulary acquisition, listening strategy use, and the relationship between incidental vocabulary acquisition and listening strategy use when they used their smartphones for independent learning. Their attitudes toward this MALL activity were also explored by use of an online questionnaire and interviews. In this section, the findings of each research question are briefly presented, followed by interpretations of the results.

5.1 RQ1: Do EFL adult learners acquire vocabulary through academic mini-lectures incidentally with their smartphones?

In order to answer the first research question, learners' incidental vocabulary acquisition was accessed by a pretest and a posttest. In general, participants' vocabulary scores increased on the posttest. The differences between pretest and posttest were statistically significant. That is, participants' vocabulary scores improved significantly after the one-week independent learning with smartphones, which suggests that the MALL activity could facilitate incidental vocabulary learning. In the aspect of vocabulary learning materials, the results confirm with previous studies which argued that learners could acquire vocabulary incidentally through academic lectures (Vidal, 2003; Smidt & Hegelheimer, 2004; Yang, 2011). Moreover, owing to the advantages of smartphone such as easy to carry around and sophisticated design of smartphone App, participants' vocabulary acquisition increased and the similar results were also shown in

prior studies (Thornton & Houser, 2002, 2003, 2005; Sandberg, Maris, & Geus, 2011; Zhang, Song, & Burston, 2011).

One interesting finding was that the participant who got the lowest scores on the TOEFL iBT listening test improved his vocabulary on the posttest the most. One possible reason could be that the scope of TOEFL iBT listening test is unlimited while the scope of vocabulary pre-and post-test is limited. In this case, it is more likely that low achievers could memorize all the learning materials and get good grades as long as they work hard. Another reason could be that participants in this current study were allowed to watch the mini-lectures with their smartphones for one week, so they could completely control the learning process, including times for watching assigned the TED Talks and usages of listening comprehension strategy. During that one week, learners had more opportunities to take advantage of their small amounts of free time with their smartphones by repeatedly watching the assigned TED Talks or using supplemental sources at any time and place. This MALL activity could help participants develop learner autonomy.

Another interesting finding was that some higher achievers' (ex: No. 35, No. 17) incidental vocabulary scores did not increase significantly, compared with some lower achievers (ex: No. 3, No. 29). One possibility could be that it might be hard for higher achievers to improve on the posttest because they've already got higher scores on the pretest. The results of Vandergrift and Tafaghodtari's (2010) study also indicated that the less skilled learners in the experimental group showed the greatest improvement in listening comprehension achievement. It seems that the less skilled learners were regarded as having more potential for improvement.

The other reason could be that the facilities offered by smartphone-based listening practice might be in conflict with the listening strategies that have been possessed by the higher achievers, which coincides with Yeh's (1994) study. So, instead of developing other listening comprehension strategies specific for smartphone-based learning, it is possible that higher achievers might prefer only applying their familiar listening strategies to facilities provided by this smartphone learning activity. Some evidence were also showed that more skilled listeners would use a repertoire of strategies in the listening practice (Vandergrift & Tafaghodtari, 2010), and they would use more metacognitive strategies than other less skilled listeners did (Goh, 2000; O' Malley & Chamot, 1990; Rost, 2002; Vandergrift, 2003).

5.2 RQ2: What listening strategies do EFL adult learners employ while watching academic mini-lectures via smartphones?

With regard to participants' listening comprehension strategy use (research question 2), participants were required to answer 22 questions about their usage of metacognitive or cognitive strategy on a five-point Likert scale online questionnaire, which was adapted from Vandergrift's (1997) model. The results from the online questionnaire show that participants generally preferred cognitive strategies to metacognitive strategies in this MALL activity, which supports Vandergrift's (1996) finding that cognitive strategies are more popular.

Moreover, the findings show that metacognitive strategies such as directed attention, self-management-Concentration, and strategy evaluation, as well as cognitive strategies such as imagery, kinesic-inferencing, and between parts inferencing were more

frequently used listening comprehension strategies by the EFL adult learners in the smartphone-based listening practice.

However, in the aspect of metacognitive strategies, in the prior study, planning strategies such as selective attention were reported to have been used frequently (Vandergrift, 1996), but participants in the current study did not appreciate the merits of planning strategies such as advanced organization as much. Compared with other metacognitive strategies, two advanced organization strategies were the least used strategies. The reason could be that smartphone-based learning was expected to occur in small periods of time. As most participants explained in the interviews, this made it hard for participants to plan how to use that short amount of time beforehand. Another reason could be that it was participants' first time using their smartphones for English learning, so they were not used to it and could not take good advantage of their smartphones for this purpose.

Another finding that did not completely support prior study is that the other metacognitive strategy called comprehension monitoring was found to have been used frequently in Vandergrift's (1997) study, but most participants in this study did not use it often. Possible explanations for this might be that the assigned TED Talks were short — about 10-minute long — which seemed appropriate for a MALL activity, so participants often used their small amounts of free time to watch them. Since these time pockets were short, learners didn't have extra time to check their listening comprehension after they finished watching.

Additionally, based on the results of the interviews, participants revealed that they didn't have the experience of using their smartphones to learn English before, so most of

the time they would continue watching the video clips from the part where they were distracted by unstable Internet or phone calls. Participants rarely checked their listening comprehension or went back to the beginning of the video clip to watch it again in order to have a complete understanding.

Interestingly, one of the most popular cognitive strategies in previous studies, called summarization (Vandergrift, 1996, 1997; Smidt & Hegelheimer, 2004), was rarely used in the current study. According to the interviews, a reason that participants didn't use summarization strategy too often was that there was not enough time for them to do a summary. Some also stated that they would only make a brief one without too many details because of their learning styles. Others mentioned that whether or not they would do summary depended on the theme of the lecture. That is, if they were interested in the lecture, they would; otherwise, they would not.

Furthermore, Graham and Macaro's (2008) study suggested that both high- and low-scaffolded group's listening performance improved through "awareness raising" of multiple strategies for 6 months, so it might be necessary to provide learners with explicit strategy instruction to enhance their listening comprehension.

5.3 RQ3: What is the relationship between EFL adult learners' use of listening comprehension strategies and incidental vocabulary acquisition through academic mini-lectures?

The third research question examined the relationship between participants' metacognitive/cognitive listening strategy use and their incidental vocabulary acquisition in this MALL activity. The findings suggest that none of the cognitive strategies were highly correlated with vocabulary acquisition, though cognitive strategies were more

popular than metacognitive strategies in this study. The findings only show a statistically significant correlation between two of the 11 metacognitive strategies and vocabulary differences. These two metacognitive strategies were directed attention and strategy evaluation. The results indicate that participants would gain more vocabulary incidentally from watching the assigned TED Talks with their smartphones as they used strategy evaluation more frequently. On the other hand, the more frequently participants used these directed attention, the lower vocabulary gains they would get.

In terms of directed attention strategy, learners would pay more attention to the gist of the lecture instead of unfamiliar words, phrases, or sentences. One of the exciting results is that the correlation between directed attention strategy use and incidental vocabulary acquisition show that this metacognitive strategy could significantly enhance participants' vocabulary acquisition. Though most of time participants just watched the assigned TED Talks to gain knowledge by only focusing on the main idea of the lecture, they could still acquire vocabulary incidentally.

A reason that strategy evaluation could statistically facilitate learners' vocabulary learning could be that the one-week self-directed listening allowed participants to take advantage of autonomous learning. Since learners had one week to try and employ as many listening comprehension strategies as possible to increase their listening comprehension, participants were able to develop other listening comprehension strategies, especially for MALL activity, to assist their listening comprehension. The listening comprehension strategies developed in the current study were smartphone-based learning with the computer, subtitles on the TED app, and earphones. It appears that the

better lecture comprehension participants had, the more vocabulary they could acquire, which is in line with Krashen's (1982; 1985) idea that comprehensibility is a necessity for language acquisition.

5.4 RQ4: What are EFL adult learners' attitudes toward the MALL activity?

Even though the main goals of this study were to explore participant's incidental vocabulary acquisition and listening comprehension strategy use through TED Talks, their attitudes toward this MALL activity were also explored. According to the results of the online questionnaire and semi-structured interviews, the mean scores of the MALL activity on the three aspects of (1) Usability, (2) Effectiveness, and (3) Satisfaction were more than three points on a five-point Likert scale. The results of the study indicate that most participants had a positive attitude toward this MALL activity.

However, a few participants did not completely agree with statements on the MALL activity in the aspects of usability, effectiveness, and satisfaction. After the experiment, they shared their opinions in the interview. In terms of usability, unstable Internet connection would hinder some participants, who didn't have unlimited Internet to use, from using their smartphones to watch the assigned TED Talks. As for effectiveness, some participants stated that it was their first time participating in a MALL activity, so they had never thought of making efficient use of brief time segments with their smartphones. The other explanation was that their lack of earphones prevented them from watching the TED Talks with their smartphones in public because of their fear of bothering others.

Moreover, because it was often too noisy outside for participants it was hard for them to watch the video clips without earphones. However, earphones were considered an extra device that they would not usually have. Finally, in the aspect of satisfaction, a few participants were unsatisfied with the MALL activity because of their inability to get used to smartphone-based learning.

With regard to the main advantages of using smartphones for English learning, most of the participants mentioned in the interviews that it was easy to carry smartphones around, which could facilitate their using small amounts of time for watching TED Talks. Some participants also stated that this MALL activity created a casual and stress-free learning environment for them. Furthermore, the sophisticated design of smartphone app made it easy for learners to learn, concentrate on English learning, and make good use of small amounts of time.

The biggest disadvantage mentioned in the interviews was the small screen of smartphones made some participants eyes feel uncomfortable if they watched the video clips too long. The other two disadvantages noted were unstable wireless Internet connection and the lack of earphones. From participants' responses to the aspects of effectiveness, satisfaction, and disadvantages, it seems that the lack of earphones might be an important factor preventing learners from using smartphones to learn English in the future.

5.5 Pedagogical Implications

In this study, the primary purpose of the MALL activity was the enhancement of incidental vocabulary acquisition. It was exciting to find that incidental vocabulary acquisition could occur through the use of authentic video clips of academic lectures. Every participant in the current study acquired some target words incidentally from this MALL activity, even though their English listening abilities were not at the same level. The results also show that their incidental vocabulary gains were statistically significant. Additionally, most participants revealed that they had positive attitudes toward this MALL activity because they had never thought of using smartphones to learn and found many advantages to this MALL activity. Further, the assigned TED Talks were interesting to participants, so they were willing to watch the video clips on their smartphones in their spare time. Therefore, it is possible that if learners continue watching TED Talks on smartphones, they will acquire many more vocabulary words in the long term.

As for listening strategy use, participants generally used more cognitive strategies than metacognitive strategies. The most popular strategy employed by the participants was imagery strategy — i.e., guessing what speakers said from the pictures, music, or PowerPoint presentation they used when they delivered the speech. Besides this cognitive strategy, fewer metacognitive strategies were used because participants had vague ideas of those listening strategies and they were not taught how to use them, since MALL is a new trend. The findings suggest that it is necessary to incorporate strategy instruction, especially for smartphone-based language learning, into language teaching approaches in

the future, for example by explicitly teaching learners how to plan, monitor, and assess their own self-learning when they use their smartphones for learning English efficiently.

Based on the results of the participants' learning performance on vocabulary tests and listening comprehension strategy use, the findings of this study suggest that the TED Talks were beneficial for gaining knowledge and learning language. Additionally, it seems that smartphone-based listening practice could provide learners another means for extended learning after their formal education in school. As more and more smartphone apps for language learning are invented, it is suggested that teachers train students how to utilize those learner-controlled video-based lectures on smartphone apps. Learners need to be taught and encouraged to use them rather than only be provided media materials and online resources, which might not suffice.

5.6 Limitations of the Study and Suggestions for Future Research

First of all, though many people have their own smartphones in Taiwan, it was difficult to recruit participants to join in MALL research for one month, which included one pretest, one posttest, one week of independent learning, one online questionnaire, and a 10-minute semi-structured interview. Therefore, this study only examined the short-term effects on incidental vocabulary acquisition of watching academic lectures on smartphones by giving participants a pretest and a posttest within one month. It is suggested that future studies not only implement pre-and posttests, but also implement delayed posttests to examine whether learners' vocabulary gains could be retained for an extended period of time.

Secondly, because of difficulties of recruiting participants, there was no control group in the current study. Although participants' incidental vocabulary gains increased statistical significantly, it was hard to make the conclusion that the results were due to this smartphone-based learning or extra learning. For future studies, it is suggested that researchers recruit another group of participants as the control group in comparison with the experimental group.

Thirdly, as for the types of vocabulary words, the 25 target words in current study were chosen and categorized into three groups: academic words, technical words, and low frequency words. The results indicated that incidental vocabulary acquisition did occur in the smartphone-based learning, but it is still unclear that which type of vocabulary words would benefit participants the most. Therefore, it is recommended that future studies not only examine the incidental vocabulary acquisition in the smartphone-based learning but also the types of vocabulary words that participants could gain.

Fourthly, the listening strategies used in this study incorporated conventional listening comprehension strategies and some characters of smartphones such as mobility and wireless Internet use. Though participants revealed that they still used other listening strategies to enhance their listening comprehension, the researcher could only get the information of other listening strategies from interviews, which could not be analyzed quantitatively. In the future, it is suggested that a standardized listening strategy for mobile devices assessment is needed so that future studies can explore the relationship between mobile-based listening strategy and incidental vocabulary learning. The results could recommend to learners some effective listening strategies for language learning.

Fifthly, in the one-week independent learning with smartphones, the researcher kept contacting participants to remind them to watch the assigned TED Talks through LINE, a free smartphone app for contacting people. In that week, participants received the instructions for TED app, the topic names of the three assigned TED Talks, and a link to the online questionnaire through LINE. A few participants revealed in the interviews that they felt confused when reading the instructions for TED app, so they didn't make good use of the functions offered by the smartphone app. The underused functions included "subtitles", "download", and "bookmark". Future studies that conduct any MALL related research should clearly demonstrate how to use the mobile device or smartphone app face to face and give participants some time to get used to it. It is necessary for every participant to get on track before the experiment starts.

Finally, due to the difficulties of recruiting people in other cities, the participants in the current study were mostly undergraduates or graduates in the same university as the researcher goes to or from other universities in northern Taiwan. It is suggested that future studies include students of different ages such as high school students, or even include those who are working, in order to examine whether this MALL activity could be beneficial to other groups of people. If it is, this new kind of language learning with mobile devices could be promoted for informal and lifelong learning. That is, those who have finished their formal education could continue learning languages with mobile devices in their spare time.

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APPENDICES

APPENDIX A

Transcript: Lecture 1---To hear this music, you have to be there.
By Ryan Holladay Posted Jan, 2014

(Music) For any of you who have visited or lived in New York City, these shots might start to look familiar. This is Central Park, one of the most beautifully designed public spaces in America. But to anyone who hasn't visited, these images can't really fully convey. To really understand Central Park, you have to physically be there. Well, the same is true of the music, which my brother and I composed and mapped specifically for Central Park. (Music)

I'd like to talk to you today a little bit about the work that my brother Hays and I are doing -- That's us there. That's both of us actually — specifically about a concept that we've been developing over the last few years, this idea of location-aware music.

Now, my brother and I, we're musicians and music producers. We've been working together since, well, since we were kids, really. But recently, we've become more and more interested in projects where art and technology intersect, from creating sight-specific audio and video installation to engineering interactive concerts.

But today I want to focus on this concept of composition for physical space.

But before I go too much further into that, let me tell you a little bit about how we got started with this idea. My brother and I were living in New York City when the artists Christo and Jeanne-Claude did their temporary installation, The Gates, in Central Park. Hundreds of these brightly-colored sculptures decorated the park for a number of weeks, and unlike work that's exhibited in a more neutral space, like on the walls of a gallery or a museum, this was work that was really in dialogue with this place, and in a lot of ways, The Gates was really a celebration of Frederick Olmsted's incredible design. This was an experience that stayed with us for a long time, and years later, my brother and I moved back to Washington, D.C., and we started to ask the question, would it be possible, in the same way that The Gates responded to the physical layout of the park, to compose music for a landscape? Which brought us to this.

(Music)

On Memorial Day, we released "The National Mall," a location-aware album released exclusively as a mobile app that uses the device's built-in GPS functionality to sonically map the entire park in our hometown of Washington, D.C. Hundreds of musical segments

are geo-tagged throughout the entire park so that as a listener traverses the landscape, a musical score is actually unfolding around them. So this is not a playlist or a list of songs intended for the park, but rather an array of distinct melodies and rhythms that fit together like pieces of a puzzle and blend seamlessly based on a listener's chosen trajectory. So think of this as a choose-your-own-adventure of an album.

Let's take a closer look. Let's look at one example here. So using the app, as you make your way towards the grounds surrounding the Washington Monument, you hear the sounds of instruments warming up, which then gives way to the sound of a mellotron spelling out a very simple melody. This is then joined by the sound of sweeping violins. Keep walking, and a full choir joins in, until you finally reach the top of the hill and you're hearing the sound of drums and fireworks and all sorts of musical craziness, as if all of these sounds are radiating out from this giant obelisk that punctuates the center of the park. But were you to walk in the opposite direction, this entire sequence happens in reverse. And were you to actually exit the perimeter of the park, the music would fade to silence, and the play button would disappear.

We're sometimes contacted by people in other parts of the world who can't travel to the United States, but would like to hear this record. Well, unlike a normal album, we haven't been able to accommodate this request. When they ask for a C.D. or an MP3 version, we just can't make that happen, and the reason is because this isn't a promotional app or a game to promote or accompany the release of a traditional record. In this case, the app is the work itself, and the architecture of the landscape is intrinsic to the listening experience.

Six months later, we did a location-aware album for Central Park, a park that is over two times the size of the National Mall, with music spanning from the Sheep's Meadow to the Ramble to the Reservoir.

Currently, my brother and I are working on projects all over the country, but last spring we started a project, here actually at Stanford's Experimental Media Art Department, where we're creating our largest location-aware album to date, one that will span the entirety of Highway 1 here on the Pacific Coast.

But what we're doing, integrating GPS with music, is really just one idea. But it speaks to a larger vision for a music industry that's sometimes struggled to find its footing in this digital age, that they begin to see these new technologies not simply as ways of adding bells and whistles to an existing model, but to dream up entirely new ways for people to interact with and experience music.

Thank you (Applause).

Transcript: Lecture 2---The $80 prosthetic knee that's changing lives
By Krista Donaldson Posted Dec, 2013

Nine years ago, I worked for the U.S. government in Iraq, helping rebuild the electricity infrastructure. And I was there, and I worked in that job because I believe that technology can improve people's lives. One afternoon, I had tea with a storekeeper at the Al Rasheed Hotel in Baghdad, and he said to me, "You Americans, you can put a man on the moon, but when I get home tonight, I won't be able to turn on my lights." At the time, the U.S. government had spent more than two billion dollars on electricity reconstruction. How do you ensure technology reaches users? How do you put it in their hands so that it is useful?

So those are the questions that my colleagues and I at D-Rev ask ourselves. And D-Rev is short for Design Revolution. And I took over the organization four years ago and really focused it on developing products that actually reach users, and not just any users, but customers who live on less than four dollars a day. One of the key areas we've been working on recently is medical devices, and while it may not be obvious that medical devices have something in common with Iraq's electricity grid then, there are some commonalities. Despite the advanced technology, it's not reaching the people who need it most.

So I'm going to tell you about one of the projects we've been working on, the ReMotion Knee, and it's a prosthetic knee for above-knee amputees. And this project started when the Jaipur Foot Organization, the largest fitter of prosthetic limbs in the world, came to the Bay Area and they said, "We need a better knee." Chances are, if you're living on less than four dollars a day, and you're an amputee, you've lost your limb in a vehicle accident. Most people think it's land mines, but it's a vehicle accident. You're walking by the side of the road and you're hit by a truck, or you're trying to jump on a moving train, you're late for work, and your pant leg gets caught. And the reality is that if you don't have much money, like this young named Kamal right here, the option you really have is a bamboo staff to get around. And how big a problem is this? There's over three million amputees every year who need a new or replacement knee.

And what are their options? This is a high-end. This is what we'd call a "smart knee." It's got a microprocessor inside. It can pretty much do anything, but it's 20,000 dollars, and to give you a sense of who wears this, veterans, American veterans coming back from Afghanistan or Iraq would be fit with something like this. This is a low-end titanium knee. It's a polycentric knee, and all that that means is the mechanism, is a four-bar mechanism, that mimics a natural human knee. But at 1,400 dollars, it's still too expensive for people like Kamal. And lastly, here you see a low-end knee. This is a knee that's been designed specifically for poor people. And while you have affordability, you've lost on functionality. The mechanism here is a single axis, and a single axis is like a door hinge.

So you can think about how unstable that would be. And this is the type of mechanism that the Jaipur Foot Organization was using when they were looking for a better knee, and I just wanted to give you a sense of what a leg system looks like, because I'm showing you all these knees and I imagine it's hard to think how it all fits together. So at the top you have a socket, and this fits over someone's residual limb, and everyone's residual limb is a little bit different. And then you have the knee, and here I've got a single axis on the knee so you can see how it rotates, and then a pylon, and then a foot. And we've been able to develop a knee, a polycentric knee, so that type of knee that acts like a human knee, mimics human gait, for 80 dollars retail.

(Applause)

But the key is, you can have this great invention, you can have this great design, but how do you get it to the people who most need it? How do you ensure it gets to them and it improves their lives?

So at D-Rev, we've done some other projects, and we looked at three things that we really believe gets technologies to customers, to users, to people who need it.

And the first thing is that the product needs to be world class. It needs to perform on par or better than the best products on the market. Regardless of your income level, you want the most beautiful, the best product that there is. I'm going to show you a video now of a man named Ash. You can see him walking. He's wearing the same knee system here with a single axis knee. And he's doing a 10-meter walk test. And you'll notice that he's struggling with stability as he's walking. And something that's not obvious, that you can't see, is that it's psychologically draining to walk and to be preventing yourself from falling. Now this is a video of Kamal. You remember Kamal earlier, holding the bamboo staff. He's wearing one of the earlier versions of our knee, and he's doing that same 10-meter walk test. And you can see his stability is much better.

So world class isn't just about technical performance. It's also about human performance. And most medical devices, we've learned, as we've dug in, are really designed for Westerners, for wealthier economies. But the reality is our users, our customers, they do different things. They sit cross-legged more. We see that they squat. They kneel in prayer. And we designed our knee to have the greatest range of motion of almost any other knee on the market.

So the second thing we learned, and this leads into my second point, which is that we believe that products need to be designed to be user-centric. And at D-Rev, we go one step further and we say you need to be user-obsessed. So it's not just the end user that you're thinking about, but everyone who interacts with the product, so, for example, the prosthetist who fits the knee, but also the context in which the knee is being fit. What is

the local market like? How do all these components get to the clinic? Do they all get there on time? The supply chain. Everything that goes into ensuring that this product gets to the end user, and it goes in as part of the system, and it's used.

So I wanted to show you some of the iterations we did between the first version, the Jaipur Knee, so this is it right here. (Clicking) Notice anything about it? It clicks. We'd seen that users had actually modified it. So do you see that black strip right there? That's a homemade noise dampener. We also saw that our users had modified it in other ways. You can see there that that particular amputee, he had wrapped bandages around the knee. He'd made a cosmesis. And if you look at the knee, it's got those pointy edges, right? So if you're wearing it under pants or a skirt or a sari, it's really obvious that you're wearing a prosthetic limb, and in societies where there's social stigma around being disabled, people are particularly acute about this.

So I'm going to show you some of the modifications we did. We did a lot of iterations, not just around this, but some other things. But here we have the version three, the ReMotion Knee, but if you look in here, you can see the noise dampener. It's quieter. The other thing we did is that we smoothed the profile. We made it thinner. And something that's not obvious is that we designed it for mass production.

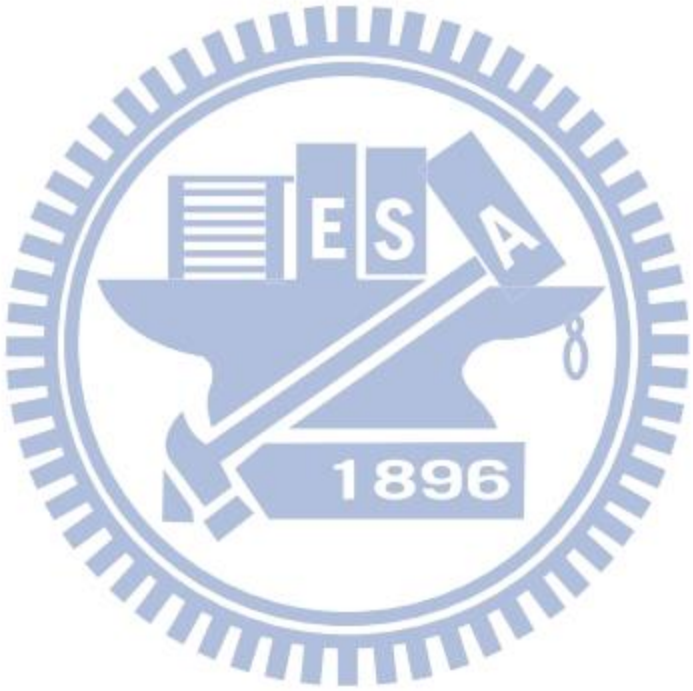
And this goes into my last point. We really, truly believe that if a product is going to reach users at the scale that it's needed, it needs to be market-driven, and market-driven means that products are sold. They're not donated. They're not heavily subsidized. Our product needs to be designed to offer value to the end user. It also has to be designed to be very affordable. But a product that is valued by a customer is used by a customer, and use is what creates impact. And we believe that as designers, it holds us accountable to our customers. And with centralized manufacturing, you can control the quality control, and you can hit that $80 price point with profit margins built in. And now, those profit margins are critical, because if you want to scale, if you want to reach all the people in the world who possibly need a knee, it needs to be economically sustainable.

So I want to give you a sense of where we are at. We have fit over 5,000 amputees, and one of the big indicators we're looking at, of course, is, does it improve lives? Well, the standard is, is someone still wearing their knee six months later? The industry average is about 65 percent. Ours is 79 percent, and we're hoping to get that higher. Right now, our knees are worn in 12 countries. This is where we want to get, though, in the next three years. We'll double the impact in 2015, and we'll double it each of the following years after that. But then we hit a new challenge, and that's the number of skilled prosthetists who are able to fit knees.

So I want to end with a story of Prinima. Prinima was 18 years old when she was in a car accident where she lost her leg, and she traveled 12 hours by train to come to the clinic to be fit with a knee, and while all of the amputees who wear our knees affect us as the designers, she's particularly meaningful to me as an engineer and as a woman, because she was in school, she had just started school to study engineering. And she said, "Well, now that I can walk again, I can go back and complete my studies." And to me she represents the next generation of engineers solving problems and ensuring meaningful technologies reach their users.

So thank you.

(Applause)



Transcript: Lecture 3---A promising test for pancreatic cancer---from a teenager
By Jack Andraka Posted July, 2013

Have you ever experienced a moment in your life that was so painful and confusing that all you wanted to do was learn as much as you could to make sense of it all?

When I was 13, a close family friend who was like an uncle to me passed away from pancreatic cancer. When the disease hit so close to home, I knew I needed to learn more,so I went online to find answers.

Using the Internet, I found a variety of statistics on pancreatic cancer, and what I had found shocked me. Over 85 percent of all pancreatic cancers are diagnosed late, when someone has less than a two percent chance of survival. Why are we so bad at detecting pancreatic cancer? The reason? Today's current modern medicine is a 60-year-old technique. That's older than my dad.

(Laughter)

But also, it's extremely expensive, costing 800 dollars per test, and it's grossly inaccurate,missing 30 percent of all pancreatic cancers. Your doctor would have to be ridiculously suspicious that you have the cancer in order to give you this test. Learning this, I knew there had to be a better way. So I set up a scientific criteria as to what a sensor would have to look like in order to effectively diagnose pancreatic cancer. The sensor would have to be inexpensive, rapid, simple, sensitive, selective, and minimally invasive.

Now, there's a reason why this test hasn't been updated in over six decades, and that's because, when we're looking for pancreatic cancer, we're looking at your bloodstream,which is already abundant in all these tons and tons of protein, and you're looking for this miniscule difference in this tiny amount of protein, just this one protein. That's next to impossible.

However, undeterred due to my teenage optimism -- (Applause) — I went online to a teenager's two best friends, Google and Wikipedia. I got everything for my homework from those two sources. And what I had found was an article that listed a database of over 8,000 different proteins that are found when you have pancreatic cancer. So I decided to go and make it my new mission to go through all these proteins and see which ones could serve as a biomarker for pancreatic cancer. And to make it a bit simpler for myself, I decided to map out a scientific criteria. And here it is. Essentially first, the protein would have to be found in all pancreatic cancers at high levels in the bloodstream in the earliest stages, but also only in cancer.

And so I'm just plugging and chugging through this gargantuan task, and finally, on the 4,000th try, when I'm close to losing my sanity, I find the protein. And the name of the protein I'd located was called mesothelin, and it's just your ordinary, run-of-the-mill type protein, unless of course you have pancreatic, ovarian or lung cancer, in which case it's found at these very high levels in your bloodstream. But also the key is that it's found in the earliest stages of the disease, when someone has close to 100 percent chance of survival.

So now that I'd found a reliable protein I could detect, I then shifted my focus to actually detecting that protein, and, thus, pancreatic cancer. Now, my breakthrough came in a very unlikely place, possibly the most unlikely place for innovation: my high school biology class, the absolute stifler of innovation.

(Laughter) (Applause)

And I had snuck in this article on these things called carbon nanotubes, and that's just a long, thin pipe of carbon that's an atom thick and one 50 thousandth the diameter of your hair. And despite their extremely small sizes, they have these incredible properties. They're kind of like the superheroes of material science. And while I was sneakily reading this article under my desk in my biology class, we were supposed to be paying attention to these other kind of cool molecules called antibodies. And these are pretty cool because they only react with one specific protein, but they're not nearly as interesting as carbon nanotubes. And so then, I was sitting in class, and suddenly it hit me: I could combine what I was reading about, carbon nanotubes, with what I was supposed to be thinking about, antibodies. Essentially, I could weave a bunch of these antibodies into a network of carbon nanotubes such that you have a network that only reacts with one protein, but also, due to the properties of these nanotubes, it would change its electrical properties based on the amount of protein present.

However, there's a catch. These networks of carbon nanotubes are extremely flimsy, and since they're so delicate, they need to be supported. So that's why I chose to use paper. Making a cancer sensor out of paper is about as simple as making chocolate chip cookies, which I love. You start with some water, pour in some nanotubes, add antibodies, mix it up, take some paper, dip it, dry it, and you can detect cancer.

(Applause)

Then, suddenly, a thought occurred that kind of put a blemish on my amazing plan here. I can't really do cancer research on my kitchen countertop. My mom wouldn't really like that. So instead, I decided to go for a lab. So I typed up a budget, a materials list, a timeline, and a procedure, and I emailed it to 200 different professors at Johns Hopkins University and the National Institutes of Health, essentially anyone that had anything to

do with pancreatic cancer. And I sat back waiting for these positive emails to be pouring in, saying, "You're a genius! You're going to save us all!"

And — (Laughter)

Then reality took hold, and over the course of a month, I got 199 rejections out of those 200 emails. One professor even went through my entire procedure, painstakingly -- I'm not really sure where he got all this time -- and he went through and said why each and every stepwas like the worst mistake I could ever make. Clearly, the professors did not have as high of an opinion of my work as I did.

However, there was a silver lining. One professor said, "Maybe I might be able to help you, kid." So I went in that direction.(Laughter)

As you can never say no to a kid.

And so then, three months later, I finally nailed down a harsh deadline with this guy, and I get into his lab, I get all excited, and then I sit down, I start opening my mouth and talking, and five seconds later he calls in another Ph.D. Ph.D.'s just flock into this little room, and they're just firing these questions at me, and by the end, I kind of felt like I was in a clown car. There were 20 Ph.D.'s plus me and the professor crammed into this tiny office space with them firing these rapid-fire questions at me, trying to sink my procedure. How unlikely is that? I mean, pshhh.

(Laughter)

However, subjecting myself to that interrogation, I answered all of their questions, and I guessed on quite a few but I got them right, and I finally landed the lab space I needed.

But it was shortly afterwards that I discovered my once brilliant procedure had something like a million holes in it, and over the course of seven months, I painstakingly filled each and every one of those holes.

The result? One small paper sensor that costs three cents and takes five minutes to run. This makes it 168 times faster, over 26,000 times less expensive, and over 400 times more sensitive than our current standard for pancreatic cancer detection.(Applause)

One of the best parts of the sensor, though, is that it has close to 100 percent accuracy, and can detect the cancer in the earliest stages when someone has close to 100 percent chance of survival. And so in the next two to five years, this sensor could potentially lift for pancreatic cancer survival rates from a dismal 5.5 percent to close to 100 percent, and it would do similar for ovarian and lung cancer.

But it wouldn't stop there. By switching out that antibody, you can look at a different protein, thus, a different disease, potentially any disease in the entire world. So that ranges from heart disease to malaria, HIV, AIDS, as well as other forms of cancer -- anything.

And so hopefully one day we can all have that one extra uncle, that one mother, that one brother, sister, we can have that one more family member to love, and that our hearts will be rid of that one disease burden that comes from pancreatic, ovarian and lung cancer, and potentially any disease, that through the Internet anything is possible. Theories can be shared, and you don't have to be a professor with multiple degrees to have your ideas valued. It's a neutral space, where what you look like, age or gender, it doesn't matter. It's just your ideas that count. For me, it's all about looking at the Internet in an entirely new way to realize that there's so much more to it than just posting duck-face pictures of yourself online. You could be changing the world.

So if a 15-year-old who didn't even know what a pancreas was could find a new way to detect pancreatic cancer, just imagine what you could do.

Thank you.

(Applause)

APPENDIX B

Classification of Target Words

Target word	Type of word	Frequency
Physical	Academic	3
Integrate	Academic	1
Impact	Academic	2
subsidize	Academic	1
Component	Academic	1
Detect	Academic	7
Criteria	Academic	2
Statistics	Academic	1
Occur	Academic	1
Compose	Technical	3
Choir	Technical	1
Prosthetic	Technical	3
Amputee	Technical	6
Mechanism	Technical	4
Pancreatic	Technical	17
Protein	Technical	15
Sensor	Technical	5
Diagnose	Technical	2
Seamlessly	Low frequency	1
Perimeter	Low frequency	1

Polycentric	Low frequency	2
Dampener	Low frequency	2
Diameter	Low frequency	1
Painstakingly	Low frequency	2
Interrogation	Low frequency	1

APPENDIX C

Self-report categories

I. I don't remember having seen this word before.

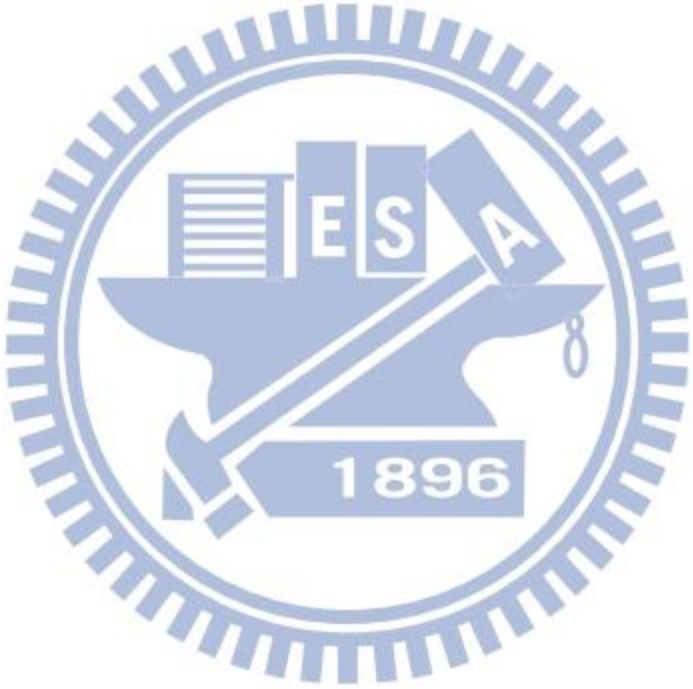
II. I have seen this word before, but I don't know what it means.

III. I have seen this word before, and I think it means _____. (synonym or translation)

IV. I know this word. It means _____. (synonym or translation)

V. I can use this word in a sentence: _____. (Write a sentence.)

(If you do this Section, please also do Section IV.)



APPENDIX D

七天的自我學習手冊 (EX: 3/12-3/18)

說明：

(1) 使用**智慧型手機**觀看**三部**指定的 TED Talk 演講，可以重複觀看數次。
您可以隨時隨地學習。

請按照 “TED APP 之使用手冊”上面的說明下載安裝 TED APP，搜尋以下這三部短片：

A. **Ryan Holladay: To hear this music you have to be there.**

B. **Krista Donaldson: The $80 prosthetic knee that's changing lives**

C. **Jack Andraka: A promising test for pancreatic cancer…from a teenager**

(2) 請您在 **3/18** 填寫**一份線上的問卷**，內容是關於這七天，您使用智慧型手機觀看影片自我學習時，所使用的**聽力策略**及對於**手機學習英語的觀感**。

當您填寫這份線上問卷時，請同時回想這七天您是如何透過手機自我學習。您將於 **3/18(二)的晚上 10:00** 收到一個**線上問卷的連結**，請您在**最後一次**看完影片後**立即填寫**，最晚在 **3/19 (三)的中午 10:00 前**填寫完畢。

(3) 最後在 **3/19 (三)後**會舉行一次**後測** (請私下與我確認時間)，主要是測驗這七天您透過手機觀賞以上三部影片的內容，測試**當天將不再撥放影片內容**，預計測試時間為**一小時**。

備註：自我學習的這七天，如有碰到任何疑問，請盡快與我聯繫。

提醒：觀看影片的次數跟**字幕語言**均不設限，**後測的題目將使用全英文出題**。

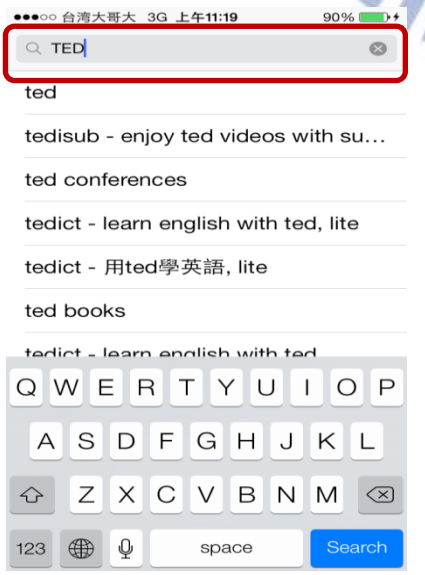
APPENDIX E

TED APP 之使用手冊

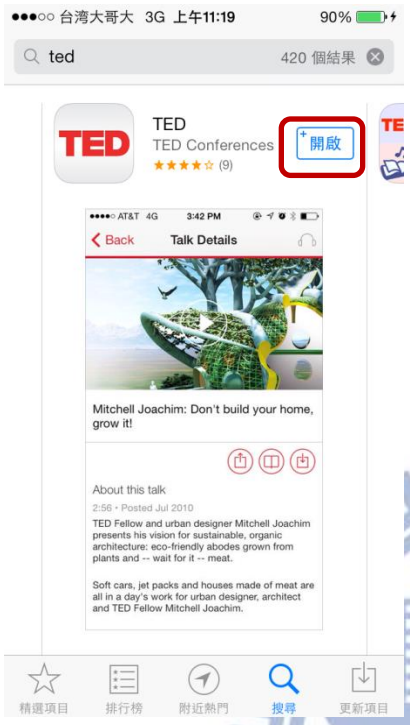
1. 下載 TED 的 APP

1.1 請進入各 Smartphone 作業系統(IOS, Android, Windows)所對應之 APP 下載位置，如紅色框的 icon (iOS 系統)

1.2 輸入"TED"在該作業系統的搜尋(Search)位置

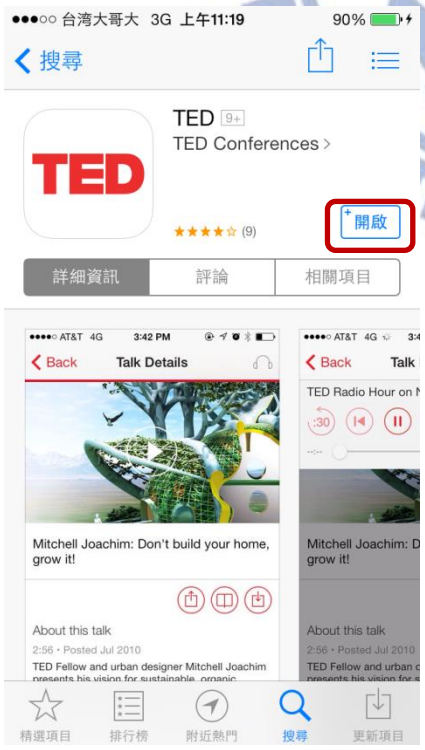


1.3 下載”TED”的 APP，若已下載則直接開啟

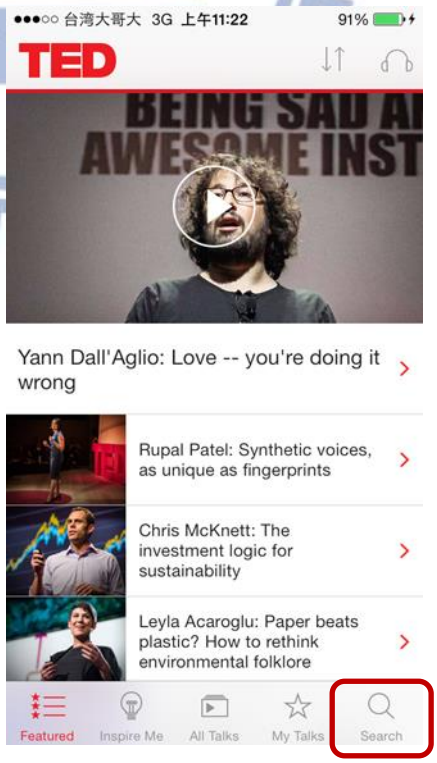


2. TED APP 操作步驟與各項功能簡介

2.1 開啟 TED 的 APP



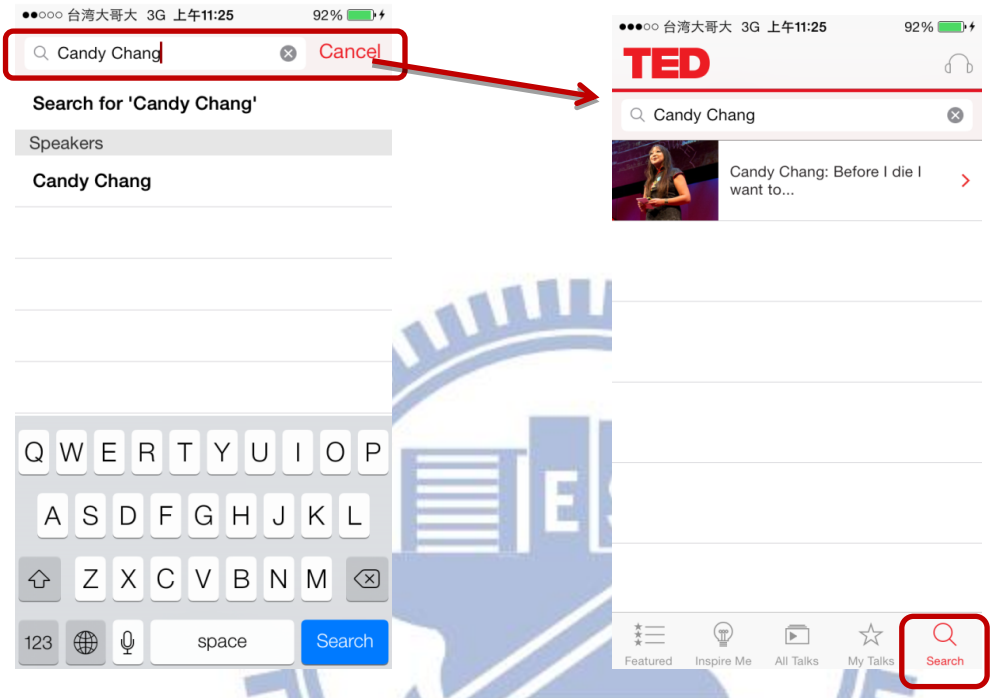
2.2 在右下角按下”Search”



2.3 輸入要找的人名或影片名稱

例如: Candy Chang “Before I die, I want to…”

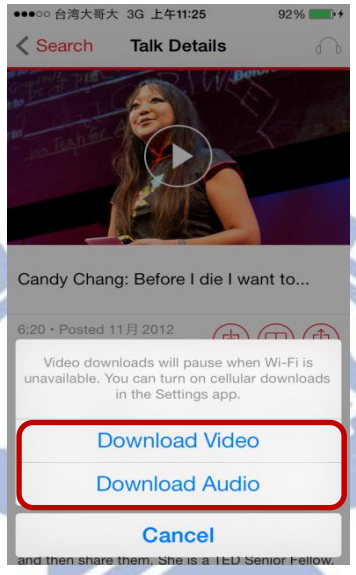
(注意:這個影片只是範例，指定的三部影片名稱將以研究者公告為主)



2.4 開啟 search 的影片，圖一中右邊框起來的 icon 由左到右分別為 “Download (下載)”、 “Bookmark(書籤)”、 “Share(分享)”。

A. **下載:** 有 Video(影音檔)與 Audio(聲音檔)可選擇，可在沒網路的情況下觀看 (如圖二)
B. **書籤:** 類似加到最愛的功能,可在“My Talks”中直接看，但須有網路才能觀看 (如圖三)
C. **分享:** 最右邊的 icon 讓使用者可以直接分享到 Facebook 或 Twitter 社群網站

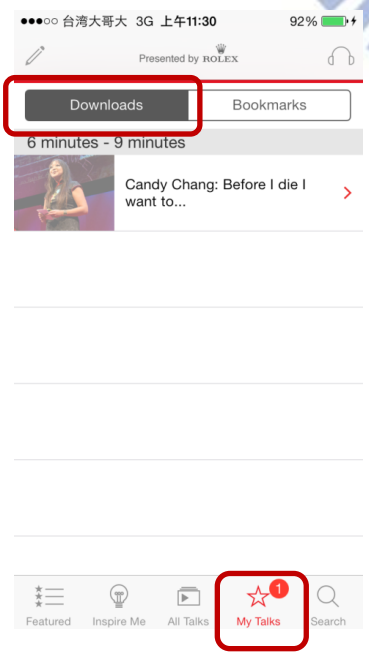
(圖一)

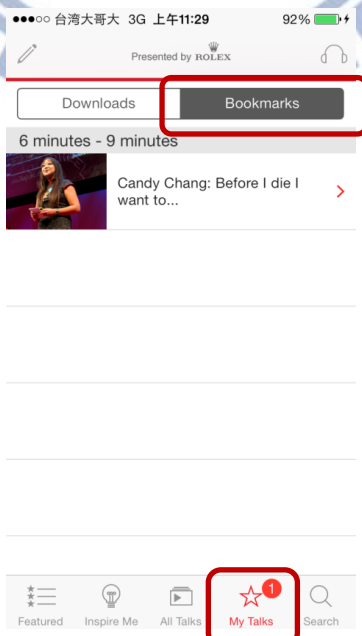


(圖二)

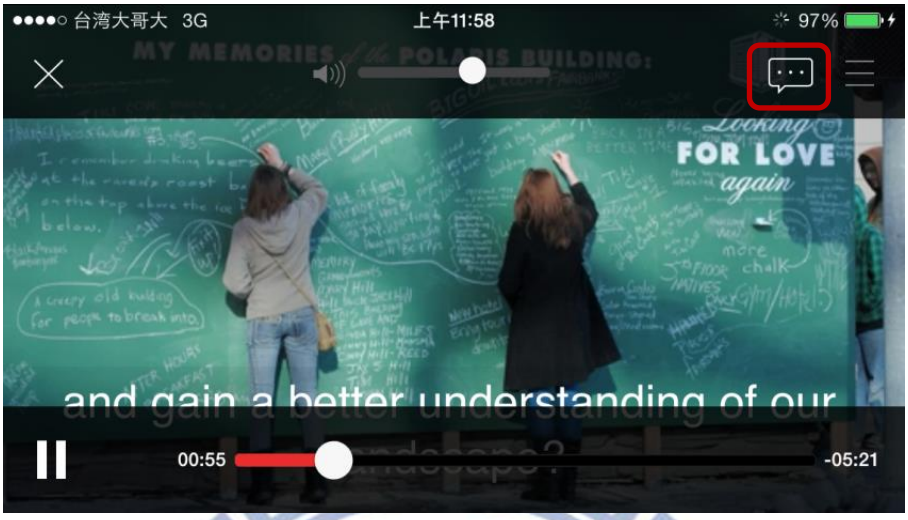
(圖三)

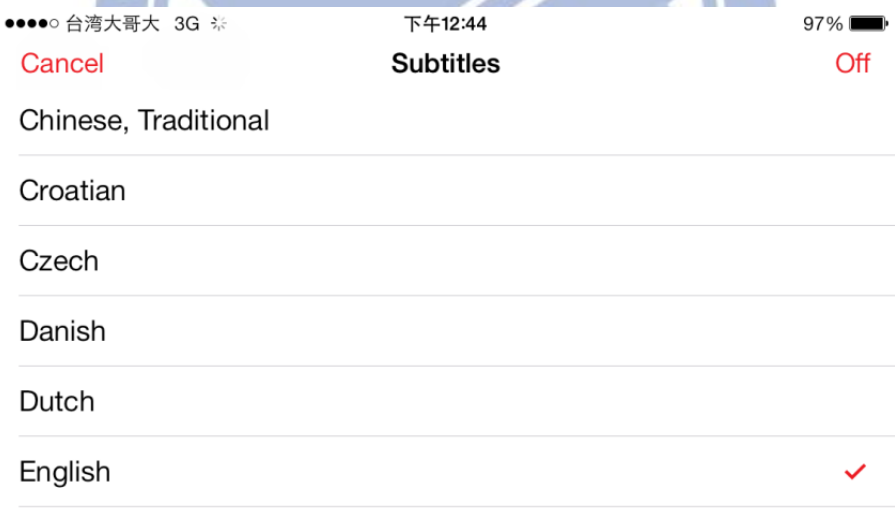
2.5 Download 與 Bookmark 皆會儲存在 My talks 中





2.6 點選右上角 icon 可選擇字幕的語言，在您選擇的語言後方會出現打勾的記號。





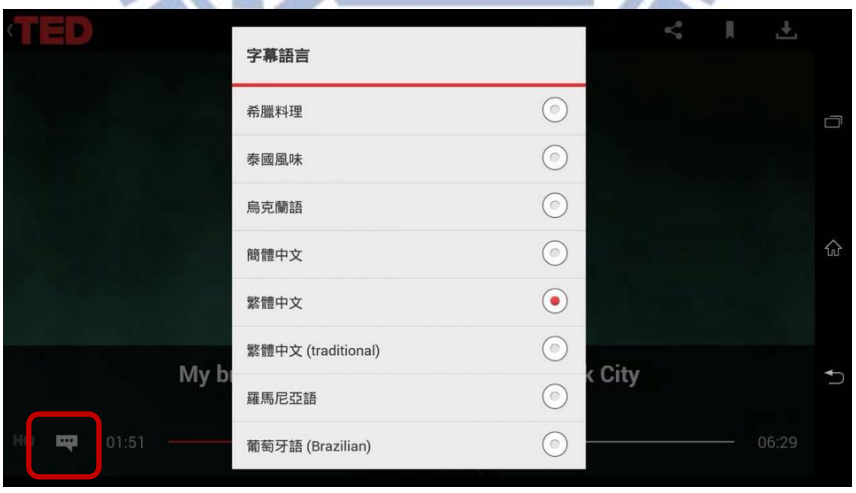
Android 作業系統介面有些許不同，但是功能與 iOS 系統是相同的。

圖四中左上角框起來的 icon 由左到右分別為 “Share(分享)” 、“Bookmark(書籤)” 、“Download (下載)” 。

A. **分享:** 最左邊的 icon 讓使用者可以直接分享到 Facebook 或 Twitter 社群網站。
B. **書籤:** 類似加到最愛的功能，可在“My Talks”中直接看，但須有網路才能觀看。
C. **下載:** 有 Video (影音檔)與 Audio (聲音檔)可選擇，可在沒網路的情況下觀看。

(圖四)

點選左下角 icon 可選擇字幕的語言，在您選擇的語言後方會出現打勾的記號。



(圖五)

APPENDIX F

智慧型手機英語學習問卷調查

這份線上問卷是關於您這七天使用智慧型手機自我學習的情況，當您填寫此問卷時，請邊回想過去這七天您是如何透過智慧型手機學習。

問卷內容總共有 4 大題，分別是學習背景、聽力策略、使用後觀感以及其他資訊，約 10 分鐘可填寫完畢，請您耐心作答，最後非常感謝您參與本研究。

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手機: 0986-261-116
Email: linda.chu0614@gmail.com
指導教授: 葉修文教授

I.學習背景:

1.1 姓名:_____

1.2 性別: □ 男生 □女生

1.3 年齡: _____ 歲

1.4 職業: □ 上班族 □ 學生 □其他

1.5 主修科系及年級: _____系/所_____年級

1.6 手機網路: □ 吃到飽 □ 計費上網 □固定流量(e.g. 5G)
□ 家中 Wi-Fi □學校/公共場所免費 Wi-Fi □ 其他 (可複選)

II.聽力策略:

說明:

這是一個沒有特定答案的問卷，請您依自身學習狀況誠實作答，您所做的回答都將被保密絕不會外流。為了精確傳達您對每個敘述的“同意”或是“不同意”程度，請您認真閱讀完每題敘述後，**圈選一個**最符合您**透過智慧型手機學習時**的選項。

1 = 非常不同意　2= 不同意　3= 沒有意見　4=同意　5=非常同意

1.	我通常專注在聽懂演講的主旨，而非拘泥於某些片段、句子、單字的理解。	1	2	3	4	5
2.	我通常會觀察演講者說話的語調及表達的方式，來猜測他/她所要傳達的訊息。	1	2	3	4	5
3.	我通常邊觀賞影片邊對照字幕。	1	2	3	4	5
4.	我會從上下文的文意去猜測某些聽不懂的句子。	1	2	3	4	5
5.	我會事先計畫如何利用零碎的時間來觀看 TED Talks 的影片。	1	2	3	4	5
6.	影片結束後，我會回想觀看時碰到的問題 (e.g. 網路不穩、其他干擾)及可以修正的方式 (e.g. 下載影片、手機轉成飛航模式)。	1	2	3	4	5
7.	我會邊看影片邊在心中把講者的話翻譯成中文。	1	2	3	4	5
8.	在開始觀看影片前，我會先在腦中計畫如何開始以利達成設定的學習目標。	1	2	3	4	5
9.	遇到聽不懂的單字時，我通常會善用句中其他認識的字去猜測它的意思。	1	2	3	4	5
10.	我會利用講者使用的圖片、音樂、PowerPoint，推敲講者所要表達的意思。	1	2	3	4	5
11.	為了讓自己能專心學習，我不會邊使用智慧型手機觀看影片邊做其他雜事。	1	2	3	4	5

12.	我通常會透過演講者的肢體語言(臉部表情、手勢、講者與現場觀眾的互動)，猜測他/她所要傳達的訊息。	1	2	3	4	5
13.	我會回顧自己所使用的聽力學習方法，並評估他們的實用性。	1	2	3	4	5
14.	影片觀看結束時，我會邊回憶內容邊做簡短摘要。	1	2	3	4	5
15.	我會利用曾經學過的造字法則(e.g.字根、字首、詞性)來猜測影片中單字可能的意思。	1	2	3	4	5
16.	我利用知識背景，理解影片中相關的內容。	1	2	3	4	5
17.	觀看影片結束時，我通常會自我檢視、評量整體的聽力理解狀況。	1	2	3	4	5
18.	我會複誦或是默念整段或是部分講者的話(e.g.單字、片語、句子)。	1	2	3	4	5
19.	我會事先下載指定的影片，讓自己學習時不因網路問題中斷。	1	2	3	4	5
20.	我通常專注在觀看較難理解的片段、句子、單字。	1	2	3	4	5
21.	如果觀看影片時被打斷 (e.g.網路不穩、電話干擾)，我會重頭再觀看一次，確保有效的理解。	1	2	3	4	5
22.	我使用字典或是手機軟體字幕的功能或其他參考資料，使自己更了解影片中的單字及內容。	1	2	3	4	5
23.	您是否有使用到其他方法幫助聽力學習?					

III.態度,觀感及想法:

說明:

這是一個沒有特定答案的問卷，請您依自身學習狀況誠實作答，您所做的回答都將被保密絕不會外流。為了精確傳達您對每個敘述的“同意”或是“不同意”程度，請您認真閱讀完每題敘述後，**圈選一個**最符合您**透過智慧型手機學習時**的選項。

1 = 非常不同意　2= 不同意　3= 沒有意見　4=同意　5=非常同意

1.	智慧型手機英語學習操作步驟及流程相當容易。	1	2	3	4	5
2.	智慧型手機讓隨時隨地學習英語變得容易。	1	2	3	4	5
3.	我願意持續使用智慧型手機學習英語。	1	2	3	4	5
4.	智慧型手機軟體 APP 讓我能輕鬆使用學習。	1	2	3	4	5
5.	透過智慧型手機, 我能掌握自我學習英語進度。	1	2	3	4	5
6.	智慧型手機學習幫助我有效地學習英語。	1	2	3	4	5
7.	我想推薦其他人使用智慧型手機學習英語。	1	2	3	4	5
8.	智慧型手機軟體 APP 的使用系統設計良好。	1	2	3	4	5
9.	我能善用零碎時間用智慧型手機學習英語。	1	2	3	4	5
10.	整體而言,我相當滿意透過智慧型手機學習英語。	1	2	3	4	5
11.	我發覺智慧型手機觀看影片學習英語很有趣。	1	2	3	4	5
12.	整體來說,使用智慧型手機學習時沒有困難。	1	2	3	4	5

IV. 其他:

4.1 您參加研究前曾經看過這三個選自 TED Talks 的影片嗎?

A. Ryan Holladay: To hear this music you have to be there. □是 □否

B. Krista Donaldson: The $80 prosthetic knee that's changing lives □是 □否

C. Jack Andraka: A promising test for pancreatic cancer…from a teenager □是 □否

4.2 在這**七天**的自我學習中，請問您**通常**都是在什麼情況下學習？

□ 等待時 (e.g. 人，公車，排隊) □ 用餐時邊吃邊看 □ 課間的休息時間
□ 睡前 □較能專心學習的環境(e.g. 圖書館) □ 其他_______ (可複選)

4.3 在這**七天**的自我學習中，請問您**通常**一天會使用幾次智慧型手機軟體 APP 去觀看指定的 TED Talk 影片？

□ 少於兩次 □ 兩到三次 □ 三到五次 □ 五到七次 □ 七次以上

4.4 ~~每次~~您使用智慧型手機軟體 APP 觀看影片時，請問您**通常**都花多久時間？

□ 半小時以內 □ 一小時 □ 一到兩小時 □ 兩到三小時 □ 三小時以上

4.5 請問您願意接受關於使用智慧型手機軟體 APP 英語學習的訪談嗎？

□ 是 □否

此份問卷到此結束，感謝您抽空填寫這份問券喔☺☺☺

APPENDIX G

Semi-structured Interview Questions

Section I

Please briefly demonstrate how you watched TED Talks with your smartphones.

Section II

A. Questions for every interviewee

	Question
Metacognitive Strategy	5. Did you plan how to utilize your spare time to watch TED Talks?
Cognitive Strategy	7. Would you translate what speakers said into Chinese in mind?
Metacognitive Strategy	8. Before watching the lecture, would you set a goal in your mind and tried to achieve it?
Cognitive Strategy	14. Would you recall what the speakers said and make a brief summary when the lecture is over?
Metacognitive Strategy	21. If you felt distracted (e.g. unstable Internet, phone calls) when watching the lectures, how did you deal with it? Review it again?

B. Questions for individuals

	Question
Metacognitive Strategy	1. Did you often focus on getting the main idea of the lectures instead of those unfamiliar words, phrases, and sentences?
Metacognitive Strategy	3. Did you often look at the subtitles while watching the lectures?
Metacognitive Strategy	6. When lecture was over, would you recall the problems (e.g. unstable Internet, other people's talking) you encountered when watching the lecture and then try to find some improvements (e.g. airplane mode, download lectures)?
Metacognitive Strategy	11. Would you prefer not to watch the lecture through your smartphones while doing other things to concentrate on learning?
Metacognitive Strategy	13. Would you recall the techniques for English listening and evaluate their advantages and disadvantages?
Metacognitive Strategy	17. When the lecture comes to the end, would you often do a survey of your general listening comprehension?
Cognitive Strategy	18. Would you repeat or read silently the whole section or part of the speech (e.g. words, phrases, sentences)?
Metacognitive Strategy	19. Would you download assigned lectures to avoid encountering Internet disconnection while watching TED Talks on smartphones?
Metacognitive Strategy	20. Would you often focus on more difficult words, phrases, and sentences?
Cognitive Strategy	22. Would you use dictionary or subtitles within the App or other recourses to make yourself understand the lecture?

	Question
Usability	1. Is it quite easy to follow the instructions and steps of using smartphones for English learning?
Effectiveness	2. Did smartphones make it easy for you to learn English anywhere and anytime?
Satisfaction	3. Would you like to continue using smartphones to learn English?
Effectiveness	5. Could you control the process of self-learning of English with smartphones?
Effectiveness	6. Could you use smartphones to learn English efficiently?
Effectiveness	9. Would you use smartphones effectively to learn English in your spare time?
Satisfaction	11. Did you found it interesting to watch video clips for English learning through smartphones?
Usability	12. Did you have any difficulty using smartphones to learn English in general?

C. An open-ended question about other listening strategy use

What other listening strategy did you use while watching TED Talks through your smartphones?

D. Merits and demerits of MALL activity

Please talk about merits and demerits about this MALL activity.