

**THE EFFECTS OF MOBILE-ASSISTED PROBLEM-
BASED LANGUAGE LEARNING ON SPEAKING
PROFICIENCY OF IRANIAN LANGUAGE LEARNERS IN
THE SECOND LANGUAGE**

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**FACULTY OF LANGUAGES AND LINGUISTICS
UNIVERSITY OF MALAYA
KUALA LUMPUR**

2020

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**FACULTY OF LANGUAGES AND LINGUISTICS
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**THE EFFECTS OF MOBILE-ASSISTED PROBLEM-BASED LANGUAGE
LEARNING ON SPEAKING PROFICIENCY OF IRANIAN LANGUAGE
LEARNERS IN THE SECOND LANGUAGE**

ABSTRACT

Problem-Based Language Learning (PBL) is a cognitive and collaborative approach to language learning which has gained attention of language educators in the last two decades. Although previous researches have revealed that PBL is a promising approach to language learning, a detailed look at the effects of mobile-assisted PBL on linguistic features of speaking proficiency of the learners and the learners' views with regard to this approach are absent. In an attempt to shed light on this issue, a confirmatory sequence mixed-methods study in the EFL context of Iran was conducted. The effects of mobile-assisted PBL was compared to the conventional language learning approach. The experimental group (n=37) went through mobile-assisted PBL instruction and the control group (n=33) went through conventional instruction. The PBL model was designed based on Hmelo Silver's (2004) model and Hung's (2006) 3C3R model. The Oxford Placement Test (OPT) was administered as a placement test, IELTS speaking test (Parts 2 and 3) was once administered as the homogeneity test-pretest and 3 times as posttests. A semi-structured interview was also conducted twice, once at the middle and the other, at the end of the treatment with the experimental group participants (n=17). The results of multivariate ANOVA (MANOVA) analysis after 26 sessions of treatment revealed that PBL can positively affect the participants' proficiency in terms of accuracy of grammatical structures, vocabulary, spoken fluency, and pronunciation; however, in terms of task achievement, no significant effect was found. In addition to this, it was found that the participants' views with regard to mobile-assisted PBL are mostly positive. The learners believed that this approach provides them with more practice in the form of monologues and dialogues to deal with real-life issues, and it also reveals their weaknesses to them. Furthermore, it increases their self-confidence, provides them with opportunities to check their pronunciation with peers in class and to compare them to valid online sources, which also affects their incidental vocabulary knowledge, their listening and speaking proficiency at the same time. This study can have pedagogical implications for curriculum designers, language teachers, material developers, and language test designers.

Keywords: Mobile-assisted problem-based language learning (PBL), speaking proficiency, Iranian EFL context, higher order thinking, collaboration

**KESAN PEMBELAJARAN BAHASA BERASASKAN MASALAH YANG
DIBANTU PERANTI MUDAH ALIH PADA KEMAHIRAN LISAN PELAJAR
DI IRAN**

ABSTRAK

Pembelajaran Bahasa Berasaskan Masalah (PBL) adalah pendekatan kognitif dan kolaboratif terhadap pembelajaran bahasa yang telah menerima perhatian pendidik bahasa dalam dua dekad kebelakangan ini. Walaupun penyelidikan terdahulu telah mendedahkan bahawa PBL adalah pendekatan yang amat berjaya dalam pembelajaran bahasa, tiadanya kajian terperinci akan kesan PBL yang dibantu peranti mudah alih pada ciri-ciri linguistik lisan para pelajar dan juga pandangan pelajar berhubung dengan pendekatan ini. Dalam usaha untuk memberi penerangan tentang masalah ini, penyelidik menjalankan kajian kaedah gabungan bertumpu selari dalam konteks EFL Iran dan membandingkan kesan PBL yang dibantu peranti mudah alih ke pendekatan pembelajaran bahasa konvensional di Iran. Kumpulan eksperimen ($n = 37$) mengikuti pengajaran PBL yang direka oleh penyelidik dan kumpulan kawalan ($n = 33$) mengikuti pengajaran konvensional. Oxford Placement Test (OPT) diberikan sebagai ujian penempatan bahasa, ujian lisan IELTS (bahagian 2 dan 3) diberikan sekali sebagai ujian homogeniti dan 3 kali sebagai post test. Temubual separa berstruktur juga dijalankan dua kali: di tengah dan di akhir rawatan dengan peserta kelompok eksperimen ($n = 17$). Keputusan analisis ANOVA multivariate (MANOVA) selepas 26 sesi rawatan menunjukkan bahawa PBL dapat mempengaruhi dengan positif kecekapan para peserta dari segi ketepatan struktur tata bahasa, kosa kata, kelancaran lisan, dan sebutan; tetapi, dari segi pencapaian tugas, tiada kesan ketara dijumpai. Di samping itu, didapati bahawa pandangan para peserta terhadap PBL yang dibantu peranti mudah alih kebanyakannya positif. Mereka percaya bahawa pendekatan ini memberi mereka lebih banyak latihan dalam bentuk monolog dan dialog untuk menangani isu-isu kehidupan sebenar, dapat mendedahkan kelemahan mereka, meningkatkan keyakinan diri mereka, memberi peluang kepada mereka untuk memeriksa sebutan mereka dengan rakan-

rakan di kelas dan membandingkannya kepada sumber dalam talian yang sah, meningkatkan pengetahuan kosa kata sampingan mereka, dan mempengaruhi kemahiran mendengar dan berbicara mereka pada masa yang sama. Kajian ini boleh mengakibatkan implikasi pedagogi untuk para pereka kurikulum, guru bahasa, pencipta bahan pembelajaran, dan pembuat ujian bahasa.

kata kunci : pembelajaran bahasa berasaskan masalah yang dibantu peranti mudah alih (PBLL), kemahiran lisan, konteks EFL Iran, kefasihan bercakap, pemikiran pesanan yang lebih tinggi, kerjasama

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List of Symbols and Abbreviations

ACTFL	American Council on the Teaching of Foreign Languages
CEFR	Common European Framework of References
CLT	Communicative Language Teaching
CLT	Cognitive Learning Theory
EFL	: English as a Foreign Language
ELL	English Language Learning
ELT	English Language Teaching
ESL	: English as a Second Language
GTM	Grammar Translation Method
IELTS	International English Language Testing System
KR-21	Kuder Richardson 21
ILI	Iran Language Institute
L1	First Language
L2	Second Language
L3	Third Language
MALL	Mobile-Assisted Language Learning
OET	Occupational English Test
OPI	Oral Proficiency Interview
PBL	Problem-Based Learning
PBL	: Problem-Based Language Learning
QCA	Qualitative Content Analysis
RCM	Oral Proficiency Interview

SCT		Social Constructivism Theory
SDL	:	Self-Directed Learning
SLT		Social Learning Theory
SPSS		Statistical Package in Social Sciences
TBLT	:	Task-Based Language Teaching
TOEFL		Test of English as a Foreign Language
ZPD	:	Zone of Proximal Development

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CHAPTER 1: INTRODUCTION

1.1 Overview

The first chapter of the study begins with an explanation of the background of the study. Following the background section, the researcher discusses the problem statement, the purpose of the study, and the significance of the study. In line with the purposes of the study, the research questions and the research hypotheses are formulated and presented. The chapter ends by reviewing the definition of the key terms.

1.2 Background of the Study

Speaking proficiency in the second language is defined as the speakers' ability to perform meaning-focused (fluency) and form-focused (grammatical accuracy) communication (Goh, and Burns, 2012; Hinkel, 2017). Other aspects of speaking proficiency in the second language include pronunciation, use of lexical resources, and a combination of form-focused and meaning-focused communication (Albino 2017; Hinkel, 2017; Iwashita, Brown, McNamara, & O'Hagan, 2008). The significant role of speaking proficiency as a communicative skill in both English as a second language (ESL) and English as a foreign language (EFL) contexts has made it one of the main queries in most English classes. As a result, there is a plethora of research on speaking proficiency in various EFL/ESL contexts (e.g., Durer & Sayar, 2013; Karatas, Alci, Bademcioglu, & Ergin, 2016; Diaab, 2016; Lu & Zheng, 2018; Purnama, Fauziati, Hum, & Wijayanto, 2017; Zeinivand, Azizifar, & Gowhary, 2015; Bergil, 2016).

Indeed, as the overall aim of language teaching and learning is communication (Brown, Iwashita, & McNamara, 2005), the learners' speaking proficiency in the second of a foreign language can be an index of their language learning success (Tanaka & Ellis, 2003). Speaking proficiency is assessed in most high stakes tests such as the International

English Language Testing System (IELTS) and Test of English as a Foreign Language (TOEFL), although it is still not checked in some tests such as Gaoko test in the context of China (Yang, 2014).

The studies conducted concerning speaking proficiency have revealed that certain factors may affect speaking, i.e., attitude (Durer & Sayar, 2013; Zeinivand et al., 2015), willingness to communicate (Bergil, 2016), gender and anxiety (Öztürk, & Nurdan, 2012), blended learning methods (Samadi, Maghsoudi, & Azizmohammadi, 2014), pronunciation instruction (Atli & Bergil, 2012), strategy-instruction (Moradi & Talebi, 2014), and cultural background (Kim, Tatar, & Choi, 2014). It can be inferred from these studies that at least two types of factors affect speaking proficiency of the language learners, i.e., a) affective factors such as motivation, anxiety, willingness to communicate, and b) instructional factors such as material selection, selecting teaching or learning procedures, and strategy instruction. These studies, in turn, indicate the need not only to attempt to understand language learners as 'whole-mind, whole- person' (Meier, 2000) but also to design learning procedures that can activate their learning potentials. A common shortcoming of many instructional approaches to language learning, which may impede speaking proficiency, however, is the lack of authenticity of the speaking tasks (Larsson, 2001). Although the use of language is a routine activity in people's lives, in language classes, it is solely viewed as content to be learned. As a result, the approach to practice the content is usually instructional rather than authentic (Larsson, 2001).

Another problem is converting the lesson content to an easy-to-understand content for the learners. This problem is, more or less, observed in the context of Iran, where language learning mostly occurs through books with predetermined content. Most language teaching series used in Iran, such as the 'Interchange' series authored by Richards, Hull, and Proctor (2012) confine the learners to the pre-designed conversation models and leave less room for the learners' creativity (Soleimani & Dabbaghi, 2012).

For example, in book 1 of the Interchange series, which includes 16 units (lessons), the learners are presented with 32 different conversational models. Other books used in the context, e.g., the 'Top Notch' series authored by Saslow and Ascher (2006) or the 'Headway' series authored by Soars, Soars, Falla, and Cassette (2010) also present the learners with decoded data such as conversation models, grammar lessons, vocabulary lessons with photos. These learning tasks increases the chances of learning through lower-order thinking in which learning begins with the presentation of knowledge rather than creating the need for knowledge (Conklin, 2005).

Such problems with the learning materials and teaching methods that are based on these learning materials urge the need for a new learning method that does not rely on the excessive presentation of easy-to-understand learning content. Therefore, in this study, the researcher examines the effects of mobile-assisted problem-based language learning as a possible approach to solve this problem.

1.2.1 Problem-Based Language Learning (PBL)

Recent research concerning language learning has also revealed that cognitive approaches to learning, which are usually run actively and constructively, are more effective than traditional lecture-based ones (Kessler, 2018). Learning in cognitive approaches occurs through exploring and connecting ideas (Hmelo-Silver, 2004; Savery, 2015). The language learners are guided to explore knowledge instead of being a passive recipient of data (Fromkin, Rodman, & Hyams, 2018).

Also, the gradual movement from teacher-centered approaches such as grammar-translation method (GTM), and audio-lingual method to more collaborative approaches such as communicative language teaching (CLT), and task-based language teaching (TBLT) revealed that collaborative learning is more effective than individual learning. Collaboration is in congruence with Vygotsky's concept of the Proximal Zone of Development (PZD) (Chaiklin, 2003). The main idea is PZD is that each individual has

an area of knowledge that will not be improved unless that individual collaborates with other learners who have their area of knowledge. Through this approach, learners can enhance their knowledge (Hmelo-Silver, 2004).

One of the inquiry-based approaches to learning, which is based on active use of learners' cognition and metacognition in learning and real-life situations, is that of problem-based learning (PBL) (Lee & Kwan, 2014). PBL is a self-directed learning (SDL) approach that relies on learners rather than teachers as knowledge providers. In PBL, the teachers facilitate and guide learners through higher-order thinking skills (Ansarian, Adlipour, Saber, & Shafiei, 2016). In PBL, learning content is not determined by teachers or books. The learners mostly prepare it through searching for relevant data and shortlisting related and useful information. (Kassem, 2018). Christodoulou (2014); however, does not favor problem-based education. She explains that inquiry-based approaches to learning such as PBL make heavy demands on working memory and this affects learning.

Though PBL was first introduced to medical education, it soon found its way to other disciplines such as engineering, geography, nursery, and recently social sciences (Larsson, 2001). Language learning is among the last disciplines touched by PBL. However, the consensus among many PBL educators is that PBL can affect language learning (Aliyue, 2017; Hashim, Selamat, & Raja Sulaiman, 2014; Mathews-Aydinli, 2007; Othman & Shah, 2013; Shin & Azman, 2014). Due to the novelty of the approach in language classes, many aspects of this multi-faceted language learning approach are still unknown to educators; for example, how the concept of facilitation can be fostered by the use of technology in PBL language classes. Facilitation (fostering learning processes) is usually carried out by the course tutor in PBL (Wang, Li, & Pang, 2016); however, other than human facilitators, there can be environmental facilitators (Hmelo-Silver, Duncan, & Chinn, 2007) such as technology-based facilitation. Recently and by

the advent of the digital world, the internet and mobile phones are among the leading technologies used in the sphere of language learning to the extent that such integration has received a label, i.e., blended learning (Anderson, 2018; McArthur, Lam-McArthur, & Fontaine, 2018). Technology can affect the cognitive engagement of the learners (Shea & Bidjerano, 2009), facilitate the social presence of the learners (Shin, 2018), give the learners more practice time (Hsu & Hsieh, 2011), and provide them with ample search opportunities (Silverman, 2016).

Although the application of mobile phones in language classes in the 1990s seemed to be a fanciful thought; due to restricted number of users and unfamiliarity of learners with online atmosphere, it is more a common habit by many learners to use their mobile phones to search for the meaning of words, check the accuracy of their structures and watch language learning videos on YouTube. In line with this new trend, many studies have been carried out to investigate the impact of mobile-assisted language learning (MALL) on various language skills and subskills. Burston (2013) acknowledged that over 575 research projects had been conducted between 2005 and 2013, and in most cases, the results had been promising. In another study, Afzali, Shabani, Basir, and Ramazani (2017) studied 30 more recent studies concerning MALL and language learning and concluded that, in most cases, MALL had shown a positive effect on language learning.

More recent studies have focused on the use of mobile phones in PBL classes and have assumed that it can aid learner-centered and self-directed learning (Alias, Dewitt, & Siraj (2013). Hendry, Wiggins, and Anderson (2016) argue that the use of mobile phones in PBL classes can have advantages. However, studies dealing with mobile-assisted PBL in which mobile phones are used as the main learning tool rather than an ancillary aid are extremely scant and detailed effects of deploying mobile-phones in problem-based language learning (PBL) classes is not fully understood. Therefore, the researcher was motivated to conduct a study and delve into this area.

1.3 Problem Statement

Language learning in the private sector in Iran is associated with some problems. Private language institutes are run by the learners financially; thus, one of the influential factors in determining the learning and teaching policies is the learners' expectations. Borjian (2013) explains that the learners expect the teachers' to be accountable for their learning, which can result in teacher-centered instruction and preference in providing the learning content by the teacher. In addition, although the focus in the private sector is on the speaking skill, attention to higher-order thinking, and technology is missing in the context of Iran (Gilakjani, 2013). For example, In Iran Language Institute (ILI), which is the most widespread network of language classes in Iran, learners are obliged to turn their phones off as they enter the class, and the classes are not equipped with any other type of online search tools. Therefore, one of the current challenges in the EFL context of Iran is familiarizing the language educators and learners with the role of mobile phones in language learning processes.

Currently, the internet and the online data, as significant sources of information, are mostly ignored in Iranian language classes. Considering that Iran is an EFL context and not in contact with many English native speakers, the learners need to use the internet to have access to authentic data. Also, as Iranian EFL teachers play a considerable role in shaping learning for the learners (Akbari, 2015), the learners lose their chance to make use of their higher-order reasoning skills. This situation may be the cause of low retention of vocabulary and grammar knowledge among Iranian EFL learners (Gorjian, Moosavinia, Ebrahimi Kavari, Asgari, & Hydareei, 2011). Mahmoodzadeh (2012) also notes that Iranian EFL learners lose their confidence in speaking, as they are not sure about some grammatical structures they use, an issue which affects their speaking fluency and their communicative success.

The problems mentioned above indicate that what is being currently conducted in language classes in Iran may not be the desired outcome for the language learners. Also, it would be hard to conclude the learning procedure suggested in this study can solve the problems unless it is subject to a comprehensive study in which the learners' views are also taken into account.

1.4 Purpose of the Study

Little attention has been accorded to how mobile-assisted PBLT can affect the spoken proficiency of EFL learners. This issue formed the overall purpose of this study, i.e., finding out the extent to which mobile-assisted PBLT could affect the speaking proficiency of EFL learners in the context of Iran.

In order to achieve the abovementioned objective, there was a need to identify the underlying components of speaking proficiency. Therefore, the public version of the IELTS exam rubrics was used. As a result, another objective of the study was to realize how mobile-assisted PBLT could affect speaking proficiency concerning fluency, pronunciation, grammatical accuracy, vocabulary, and task achievement.

As the researcher wished to have a comprehensive and in-depth look at the variables under investigation, he endeavored to not only have a quantifiable look at the data but also to collect qualitative data, i.e., interview data. Thus, the third objective of the study was to delve into the views of the respondents about mobile-assisted PBLT. Below is a list of the objectives of the study:

1. To realize whether or not mobile-assisted PBLT affects the speaking proficiency of the Iranian EFL learners.
2. To understand which aspect of speaking proficiency of the Iranian EFL learners, i.e., grammatical structures, pronunciation, vocabulary, fluency, and task achievement is affected by mobile-assisted PBLT

3. To explore the views of the Iranian EFL learners regarding mobile-assisted PBL.

1.5 Significance of the Study

The results gained from this study can make contributions to the field of applied linguistics and also the EFL context of Iran. With a focus on learner-centered, collaborative, cognitive, and metacognitive approaches to learning, scholars have been looking for practical procedures to implement these concepts in language classes. Mobile-assisted PBL is an attempt to merge these concepts into a learning procedure.

The practice in EFL contexts is often not sufficient. Samaranayake (2016) EFL learners do not have many opportunities to practice English, as they are only limited to the classroom occasions and learning materials. The mobile-assisted PBL approach does not limit the learners to the classroom boundaries. Not only can the learners practice English collaboratively at home, but also they are expected to formulate the conversations themselves rather than mimicking the conversations presented to them. This situation gives them more practice time.

By utilizing mobile-assisted PBL, the learners can practice English from home and are not obliged to attend language classes physically. This aspect of mobile-assisted PBL can provide learners in remote areas with language education. Also, this capability of mobile-assisted PBL aids learners in learning English during health crisis times and movement control obligations such as the crisis caused by the COVID-19 pandemic.

Finally, although mobile-assisted PBL is suggested in this study as an approach to enhance speaking proficiency, some aspects of this approach might not be favored by the learners. This study can provide the readership with a detailed account of such issues from the learners' perspective, as it comprises a qualitative section.

1.6 Research Questions

This study sought the answer to the following research questions:

1. How does mobile-assisted PBL affect speaking proficiency of the Iranian EFL learners?
2. Which aspect of speaking proficiency of the Iranian EFL learners, i.e., grammatical structures, pronunciation, vocabulary, fluency, and task achievement is affected by mobile-assisted PBL?
3. What are the views of the Iranian EFL learners regarding mobile-assisted PBL?

1.7 Research Hypotheses

Hand in hand with the research questions, the following research hypotheses were formulated:

H01. Mobile-assisted PBL does not have any significant effect on the speaking proficiency of the Iranian EFL learners

H02. Aspects of spoken proficiency, i.e., grammatical structure, pronunciation, vocabulary, fluency, and task achievement of Iranian EFL learners' do not significantly improve as a result of mobile-assisted PBL.

1.8 Definition of the Key Terms

Problem-Based Language Learning (PBL)

Problem-based language learning (PBL) is an extension of problem-based learning used to consider the intricacies of language learning to implement PBL in language classes successfully. Both approaches are based on identical theories, i.e., higher-order thinking, constructivism, and experiential learning. PBL is a collaborative approach to learning. The teachers' role in PBL is changed to tutors who guide the learning process. Various models have been suggested by scholars such as Hmelo-Silver (2004), Huang (2006), Savery and Duffy (1995) to implement PBL in classes. In this study, a model was designed based on the features of these models. This model was used to conduct PBL in the experimental group. The main difference between the model used in this study and

the previously used models is the close attention paid to the intricacies of learning a second language.

Speaking Proficiency

Goh and Burns (2012) define speaking proficiency in terms of performance. They explain that learners have varying degrees of ability in stating sentences fluently and accurately. The varying degrees of ability in oral communication form various levels of proficiency in the second language. By referring to fluency and accuracy as two main components of speaking proficiency, Goh and Burns (2012) discuss three significant aspects of communication, i.e., meaning-focused (fluency), form-focused (accuracy), and meaning and form-focused (complexity). Besides, Hinkel (2017) asserts that speaking in the second language requires the development of speech- processing and oral production skills. He further explains these skills as accurate pronunciation, grammar, and vocabulary, as well as information sequencing and discourse organization, are required. In line with Hinkel (2017) and according to the public version of IELTS' band descriptors, speaking can be assessed in terms of fluency and coherence, lexical resources (vocabulary), grammatical accuracy, and pronunciation. These sub-constructs were considered to assess speaking proficiency in this study. In addition, the researcher borrowed the concept of 'task achievement' and added it to the scoring model used in the current study.

Self-Directed Learning (SDL)

Self-directed learning is one of many outcomes of learner-centered learning in which learners decide what steps they should take to learn a particular content, and therefore, can guide their own learning process (Hmelo-Silver, 2004). Self-directed learning is a cognitive process and may vary from one learner to another. The role of a teacher is SDL is changed to a tutor who only gives feedback rather than determining the learning process. SDL is among the main features of PBL.

Cognitive Learning

Cognitive learning is a product of cognitive learning theory (CLT) and aims at productive, constructive, long-lasting, and active learning (Rogaten et al., 2019). CLT explains that mental processes affect learning through both internal and external factors. It is assumed that without considering cognitive learning, not all learning processes can be explained.

Cognitive learning is among the most significant characteristics of learning in PBL (Hung, 2006) and is implemented by determining certain occasions in the learning task for the learners to think about their learning.

1.9 Rationale of the Study

The researcher believes that mobile-assisted pedagogy is different from laptop-assisted and desktop-assisted computer pedagogy. Thus, only was the focus of this study only on mobile phones, but also the participants were prohibited from using any other device to connect to the online classes. Also, the researcher observed a lack of comprehensive research on PBL and speaking proficiency in the second language. Most of the previous studies have not designed a model based on language learning intricacies and only implement PBL models designed in the field of education in language classes. Examples of these models include Hmelo-Silver's (2004) model and Hung's (2006) model. These models may not be effective unless a step-by-step procedure approach to language learning is implemented. This shortcoming in the previously designed PBL models formed the second rationale for conducting this study.

One of the main drives for conducting this study was that PBL is mostly implemented in Malaysia (Shin & Azman, 2014), Pakistan (Othman & Shah, 2013), Korea (Lin, 2015) and research findings that show how it affects the Iranian EFL context are very scant. This situation indicated a need for a study that not only seeks to understand the effects of

mobile-assisted PBL but also looked at the learners' views. Therefore, the researcher conducted a study in the context of Iran.

1.10 Organization of the Thesis

This thesis is organized in 5 chapters. The first chapter includes the background of the study, problem statement, purpose, and significance of the study, along with the research questions and the hypothesis. The main theories which underpin the study are explained in Chapter 2. Firstly, the concept of PBL is made clear by reviewing the literature from PBL to PBL. In addition, characteristics of PBL such as cognitive and metacognitive thinking, collaboration, self-directed learning (SDL), and learners' autonomy are elaborated on critically. Next, the role of technology and mobile-assisted language learning is explained. Finally, the concept of speaking proficiency, models used to assess speaking proficiency, and studies conducted concerning speaking proficiency are critically reviewed.

Chapter 3 centers on the methodology of the study. Issues such as participants and setting, instrumentation, research procedure, and research design are explained in Chapter 3.

Chapter 4 depicts the analysis of the data. Both qualitative and quantitative data are analyzed by using relevant statistical tools, and the answer to research questions is sought by using the results of the analysis.

The discussion on the findings and conclusion of the study is stated in Chapter 5. Through the conclusion, the objectives of the study are restated, and a summary of the study is presented. Other sections in this chapter include the theoretical and pedagogical implications of the study, limitations of the study, and recommendations for further research.

1.11 Summary of the Chapter

In the first chapter, the problems in the Iranian EFL context concerning speaking proficiency were elaborated on. Therefore, in the problem-statement section, a detailed account of the Iranian EFL context (the public and the private sector) was given. Negligence towards the speaking skill in Iran and the need for a new cognitive approach to learning justifies the main objectives of the study, i.e., to measure the effects of mobile-assisted PBL on speaking proficiency of the Iranian EFL learners. In order to have a more in-depth look at this objective, through the second objective of the study, speaking proficiency was broken down into its components. Additionally, the researcher planned to listen to the learners' voices and to delve into their views. Based on the objectives, the research questions and hypotheses were stated. Finally, a brief definition of the key terms and the organization of the thesis was presented.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The second chapter of the study is an attempt to shed light on PBL, mobile-assisted language learning (MALL), and speaking proficiency. In the first part of the chapter, the theoretical framework of the study is explained. Next, PBL is explained as a consequence of the cognitive revolution in the 20th century. Later, a synopsis of its history is presented. Empirical studies dealing with PBL are also discussed to underpin the achievement in the field of PBL. As this study is based on mobile-assisted PBL, the literature dealing with mobile phones and language learning is also discussed. Finally, the researcher elaborated on the speaking skill, its components, and models to assess the speaking skill to justify its use in this study.

2.2 Theoretical Framework

To implement PBL in language classes, a PBL tutorship model was adopted based on Hmelo-Silver's (2004) PBL model and Hung (2006) 3C3R model. Hmelo-Silver's model is rather general and is mostly used in medical education; however, the adopted version has more detailed steps and has already been tested in language classes. Also, Hung (2006) introduced the 3C3R model, which comprises of 6 main components of problem-based learning, i.e., connection, context, content, research, reference and reflection, and these were implemented into the model. Figure 2.1 shows how the steps mentioned by Hmelo-Silver (2004) and Hung (2006) were operationalized.

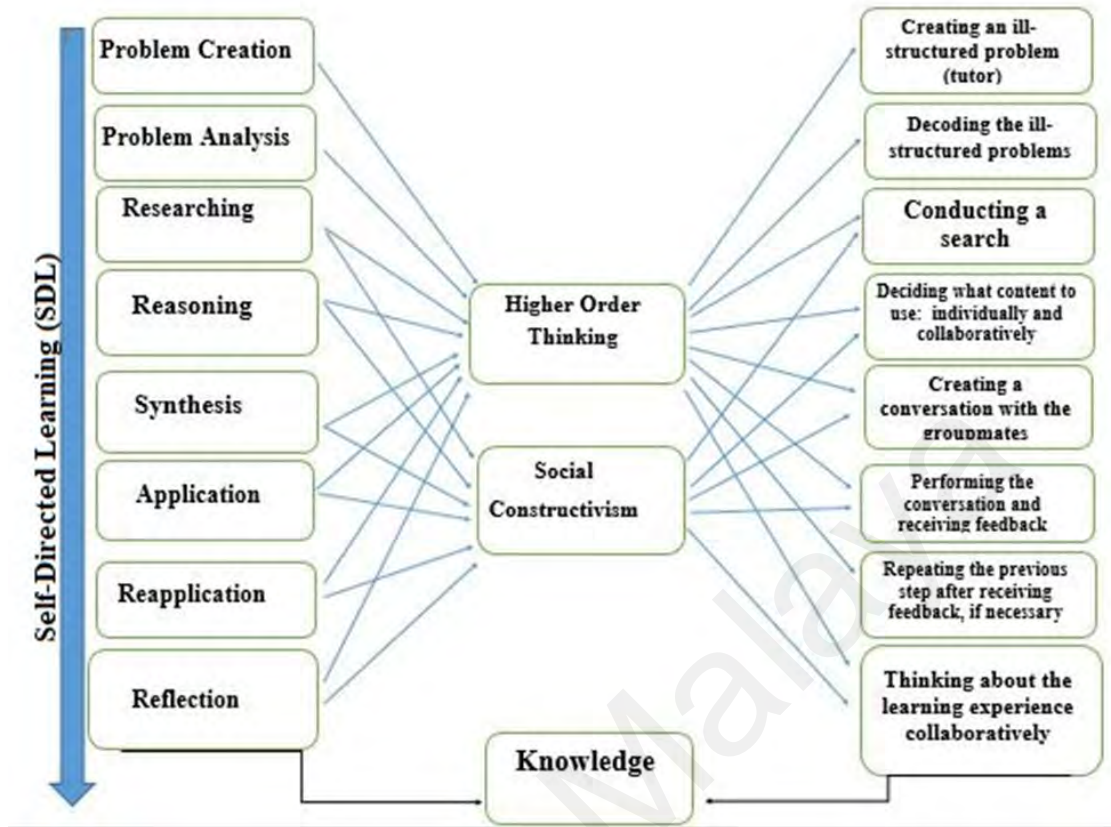


Figure 2.1: PBL model used in the study

Adopted from Hmelo-Silver (2004) and Hung (2006)

The column on the left side shows the steps suggested by Hmelo Silver (2004), i.e., problem creation, problem analysis, synthesis, application, reapplication, reflection, and knowledge (abstraction). Other steps in this column include researching, reasoning, and reflection (mentioned by both scholars) represent Hung's (2006) model. These steps are linked to the relevant theories, and based on each step, an appropriate teaching step was created. Some aspects of PBL, as mentioned by hung (2006), such as connection, content, and context, are implicit in nature. Thus, the researcher attempted to consider them within the steps taken to implement PBL by creating a link between the learning content and the context of the study.

Another significant theory used in this study is the modified version of Bloom's higher-order thinking model. This model (Figure 3.3) identifies levels of cognitive

development in learning and has been the underlying assumption of PBL (Larsson, 2001), and many language learning hypotheses such as the involvement-load hypothesis by Laufer and Hulstijn (2001). Although the model was criticized for being sequential and artificially constructed, it looks very well at learning to the extent that it is still being considered as the basis of inquiry-based approaches to learning (Savery, 2006). The model aids the researcher in utilizing the higher thinking skills of the learners. In order to conduct a more accurate study, the model designed by Anderson, Krathwohl, and Bloom (Conklin, 2005) was used, which is the revised version of Bloom's cognitive model.

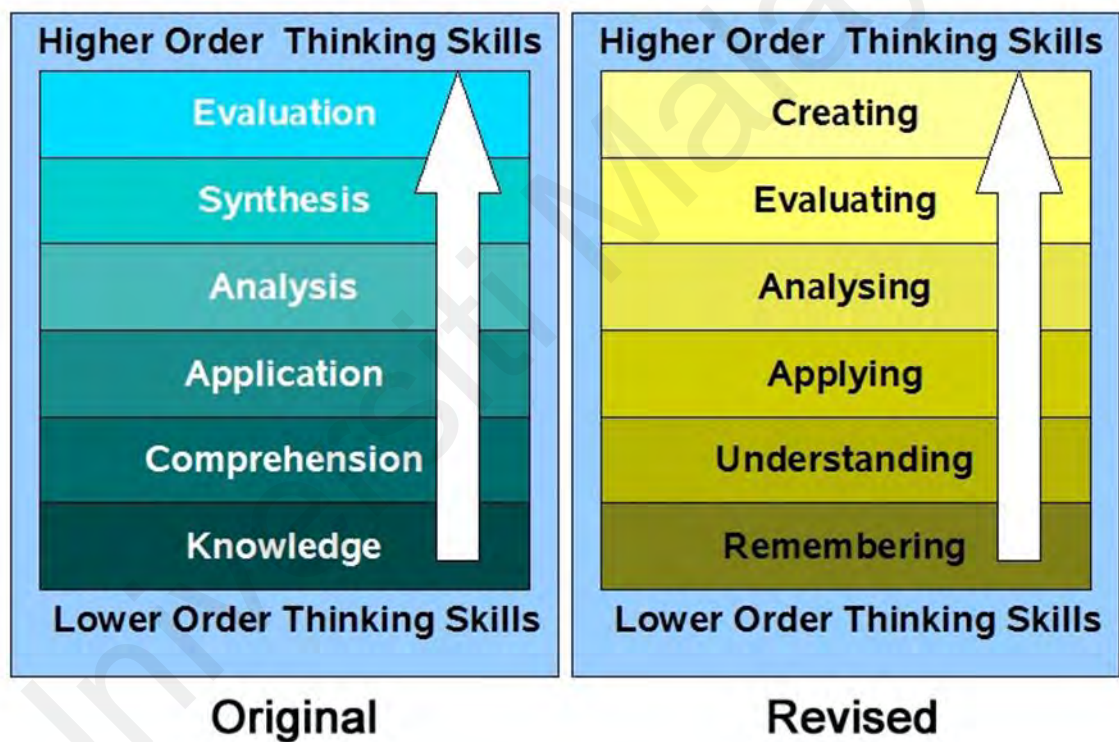


Figure 2.2: Higher order thinking (Adopted from Conklin, 2005)

In the revised version of the model, Anderson, Krathwohl, and Bloom argued that the learning concepts should be created in the minds of the learners prior to evaluation. As a result, the learners know what should be evaluated by them (Conklin, 2005).

2.3 The Concept of PBL

PBL is among the latest approaches to learning which has features such as collaboration, cognitive thinking, learner-centered instruction and learners' autonomy (Hmelo-Silver, 2004). Lee and Kwan (1997) defined PBL as:

...one of the most innovative developments in education in the past 30 years.

In PBL, the problem drives the learning. Instead of lecturing, we give the students a problem to solve. For that problem, small groups of students identify what they know already and what they need to know, set learning goals and make learning contracts with the group members (1-4). Each student learns the knowledge independently and then returns to the group to teach others that knowledge. The group uses that knowledge to solve the problem. The group reflects and elaborates on that knowledge. (p.60)

PBL has been defined as an innovative self-directed, collaborative approach to learning which makes use of students' problem-solving skills. Other characteristics involve intrinsic motivation on the part of the learner and revision of the teachers' role (Hmelo-Silver, 2004).

PBL is innovative; unlike many learning and teaching approaches that see teachers imparting the content to the learners, PBL begins with the presentation of an ill-structured problem (Savery, 2006). The problem is deliberately ill-structured, as well-structured problems may be self-explanatory and may reduce the students' cognitive engagement with the lesson. Additionally, the problems would ideally be based on real-life situations relevant to the students, drawing on the belief that the students ought to have a solid understanding of the problem. It is also collaborative as the students work in small groups to solve real-life problems. Other than small-group collaboration, they have the chance to

collaborate with other learners in the class. Collaboration in PBL classes should result in the students' entering each other's Proximal Zone. Vygotsky (1987) notes that it is in the other individual learners that one can find the missing parts of his/her knowledge.

The innovative and collaborative nature of PBL makes it an ideal teaching tool for the language classroom, given that the discussion centric quality has the potential to enhance language learning through the numerous opportunities to use the target language. Additionally, its emphasis on the use of real-life issues as learning scenarios has the potential to boost the students' motivation to learn, and thus foster language learning within the classroom (Sungur & Tekkaya, 2006).

It should be mentioned that collaboration can be fostered through technologies such as mobile phones. Indeed, different forms of social media and applications such as Telegram, Amigo, and WhatsApp have been used by mobile phone users to share information, knowledge, and opinions (Green, Brock, & Kaufman, 2004). These applications can increase enjoyment, and attract users; as a result, they have mostly been used as marketing platforms. However, there is a need for more studies to measure the possible positive effects of mobile-assisted PBL on language learning in general and speaking proficiency in particular.

Another feature of PBL is Self-Directed Learning (SDL). In PBL tutorship, the students begin by evaluating the problem in order to generate ideas for possible solutions (Savery, 2006). This process is a self-directed one, as students are in charge of learning, and tutors merely aid the process, usually through feedback provided at specific points (Hmelo-silver, 2004). Students are expected to select the required strategies to solve the problems and reflect on the effectiveness of the strategies. Every student has his/her own identity and brings this along into the ideas presented as part of the solution within the

PBL scenario. These individual ideas are negotiated in groups and applied to solve the problems. Thus, the collaborative nature of PBL (Hmelo-Silver & Barrows, 2006).

Intrinsic motivation is a goal rather than a feature in PBL. Previous studies have shown the positive effect of PBL on students' motivation. For example, Jones (2008) found that the PBL approach had motivated undergraduate nursing students to embrace learning. In addition, Rogers (2014) reported that the practice of PBL had positively motivated engineering technology students. The students' interests also play a significant role in creating intrinsic motivation (Strobel & Van Barneveld, 2009); thus, in order to motivate the students to learn, educators should aim at creating a sense of achievement for the students with each learning scenario. If the challenges posed to the students are too demanding for their cognitive level and overwhelm them, they might lose their confidence and lose motivation (Jonassen, 2000). Thus, the problems should be tailored to the students' level and vary in difficulty according to the students' ability to capitalize on the students' own motivation to learn. Additionally, posing problems relevant to the students' real-life context increases their motivation levels as they are more likely to value what they are learning.

The revised role of the teachers is one of the notable differences between traditional learning approaches and PBL. In the former, the teacher's role was to deliver lectures while in the latter, they act as tutors or facilitators, which sees a shift in function (Savery, 2006). Studies such as the one conducted by Dahlgren, Castensson, and Dahlgren (1998) have shown that PBL creates congruence between the tutors' strategies and their intentions and is well suited for moving from teacher-focused strategies to learner-focused strategies. Within the PBL approach, both tutors and students are jointly in charge of learning. Tutors facilitate the process by fostering the students' use of thinking skills, and by giving feedback after the students have attempted to find solutions to the problems

presented to them (Ansarian et al., 2016). Tutors in a PBL class are not the conductor of the classroom orchestra, preferably a member of each and every group in the class. They aid the learners to think about learning and to select proper learning strategies (Park & Ertmer, 2007). The significance of tutors' role in PBL has also resulted in several studies (mostly qualitative ones) on this issue. The consensus among many PBL tutors and educators in this field is that conducting PBL classes has more challenging than conducting conventional classes; therefore, PBL is usually recommended to experienced tutors (Duch, Groh, & Allen, 2001).

PBL situates learning in its socio-cultural context. Tan, Van der Molen, and Schmidt (2016) note that PBL is a tool to smooth transition of skills and knowledge related to one's life in society and concerning a particular context. Although the inception of PBL occurred in medical education, the effect of PBL on learning relevant socio-cultural skills was observed in other disciplines such as engineering, geography, and even the social sciences (Larsson, 2001). Not only the learners understand their required personal values in PBL, but they also learn how such values can be integrated into society.

The objectives of PBL tutorship are highly comprehensive and more relevant to the practicalities of the students' real-life than many other approaches to learning. Boud and Feletti (2013) asserted that the objectives of PBL tutorship should be viewed in terms of what students will be able to do at the end of the course. Students' development should be observed in the following areas:

- a) Professional competency
- b) Dealing with and solving problems
- c) Creative and critical reasoning

- d) Coping with unfamiliar situations and making sound and reasoned decisions
- e) Participation in creating a change
- f) Understanding others and their point of view
- g) Self-evaluation
- h) Production

Note that the eight areas listed here are skills and abilities crucial to life in the real world, be it in the education or working environment. Additionally, they are more than likely attributes employers look for in potential hires and make a stronger case for the use and application of the PBL approach in education and language learning in particular.

2.4 The History of PBL

PBL can be well understood by going through its history. Indeed, understanding the origins of PBL and evolution of PBL to what it is today can shed light on both the features and effects of PBL.

2.4.1 PBL: From Experience to Science

PBL has a scientific and non-scientific history. The non-scientific history of PBL can be traced back before the dawn of history when the most common approach to making a living was an apprenticeship. For example, young sailors who wished to learn to sail boats were obliged to gain hands-on experience in sailing. The apprentices could acquire skill and knowledge simultaneously and be paid low wages following what they did and the type of trade they were involved in. Therefore, the inception of teaching and learning in history was, in a sense, problem-based and experiential. Two significant aspects of this type of learning were a) learning by doing, and b) tutor as a guide.

The 'scientific' history of PBL can be traced back to ancient Greece. Socrates is believed to have employed it in his 'dialogos' or dialectical approach (Schmidt, 2012). Later, in the 20th century. The main precursors of PBL were Kilpatrick and Dewey (Hmelo-silver, 2004) who argued in favor of the importance of experiential learning. Although PBL was being used before it was formally known as a scientific approach to learning, not all features of PBL were incorporated in its historical use. For example, the concept of higher-order thinking must have been unknown to the masters of the craft; as a result, they might have modeled who the tasks should be done for the apprentices. Also, learning was not cooperative on many occasions, and the young learners had to work alone without any peer learning with them the same craft at the same time or even before them. As a result, the beginning of the 20th century was replete with conjectures about how education can become more productive by amending experiential learning approaches. Dewey believed that one of the most effective approaches to learning is by reflecting on experiences (Roberts, 2003). Dewey notes that experience and education are two critical elements of successful learning (Roberts, 2003). As a result, he worked on the concept of experiential learning and designed a figure for it.

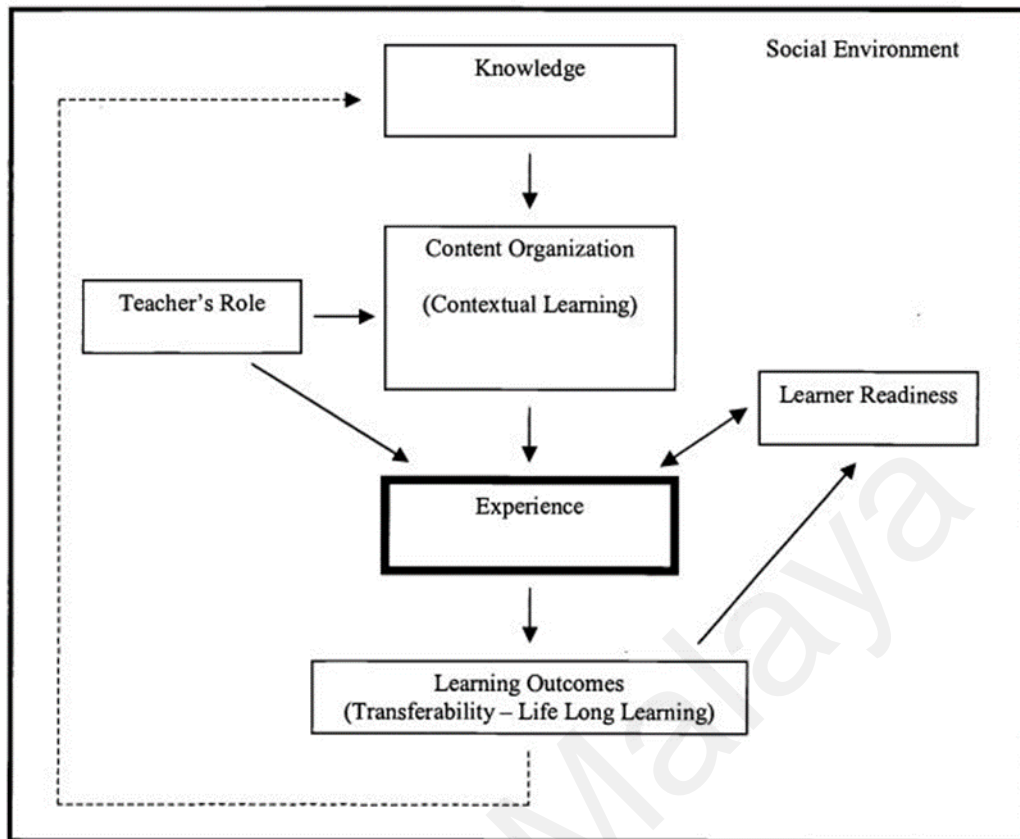


Figure 2.3: Dewey's experiential learning model (Roberts, 2003)

Looking at Dewey's experiential learning model, one can understand that several factors were significant and facilitative in the process of experiential learning. Firstly, every learning task has a social environment that cannot be ignored. The social environments include the ethics and culture of the learning context and are significant in determining the quality of learning tasks. Secondly, learning is a cycle in which knowledge leads to a learning outcome and that this cycle repeats itself. Thirdly, the tutor's role is limited, and they do not intervene with all stages of learning.

Although Dewey presented the concept of experiential learning in a figure and with clear boundaries between concepts, new findings in the field of psychology and education urged the need to have a more meticulous look at the issue. One of the concepts in this regard was 'higher-order thinking.'

2.4.2 Social Constructivist Theory (SCT)

One of the theories which underpins PBL and PBLT is that of 'Social Constructivism.' The social constructivist theory was first presented by Vygotsky (Callaghan, 1996). Unlike the cognitivist such as Piaget and Perry, who assumed that learning is a separate issue from the social context, Vygotsky (1978) strongly advocated that environment and social context play an active role in learning. Although the role of environment and social context in learning had also been discussed by Bandura (1978) in social learning theory (SLT), Vygotsky does not hold the behaviorist view about the role of society who find it the source of reinforcement; instead, Vygotsky sees social context as a source of interaction and collaboration which results in cultural and social development. Thus learning was not regarded as the product of accommodating knowledge by Vygotsky (Lee & Smagorinsky, 2000). Indeed, it is the process of integrating into society (Vygotsky, 1978). It can also be mentioned that cognitive learning theories, such as Higher Order Thinking, are the result of SCT. SCT assumes that learning has an inter-psychological and intra-psychological level. Inter-psychological learning occurs between people, and intra-psychological learning occurs inside the individual. These levels form the basis of logical reasoning, the formation of concepts and theories, and even memorization (Wertsch & Stone, 1999).

SCT represented a new outlook over knowledge, learning, motivation, and later teaching. Vygotsky (1968) assumes that individuals are constantly involved in an intellectual process of perceiving the world through language and culture. They overcome the natural limitations by attributing sense and meaning to their world. Thus, learning is not viewed as an interaction with stimuli. Vygotsky states (1968, 39):

A special feature of human perception ... is the perception of real objects ...

I do not see the world simply in color and shape but also as a world with sense

and meaning. I do not merely see something round and black with two hands;

I see a clock ...

Thus, language is the means of transmitting language and conceptual schemes, and knowledge is co-constructed rather than being constructed. PBL is based on Vygotsky's SCT, as it is a collaborative approach to learning. The pioneers' of PBL believed in the construction of meaning in the minds of individuals rather than individual understanding of reality. In addition and in line with Vygotsky, PBL scholars believe in actual development, which is defined as the capability to solve problems (Savery, 2006). Also, PBL is in line with the level of potential development in SCT theory known as Zone of Proximal Development (ZPD). Vygotsky notes that every individual has knowledge over some aspects of an issue, yet lacks knowledge over other aspects. Through collaborative learning, individuals can accumulate knowledge and complete their understanding. Vygotsky (1978, p. 85) explains that:

The level of actual development is the level of development that the learner has already reached, and is the level at which the learner is capable of solving problems independently. The level of potential development (the zone of proximal development) is the level of development that the learner is capable of reaching under the guidance of teachers or in collaboration with peers. The learner is capable of solving problems and understanding material at this level that they are not capable of solving or understanding at their level of actual development; the level of potential development is the level at which learning takes place.

2.4.3 Higher Order Thinking

Challenging traditional education for its shortcomings, i.e., being teacher-centered, theory-based, unauthentic, and unpractical, Bloom suggested that the learning processes should not begin by presentation of knowledge, rather they should begin by a 'learning

problem' (Kelly, 2017). His higher-order thinking model which begins by evaluation of knowledge was used to fill the gap in learning concerning the order of the activities which should be done by the learners.

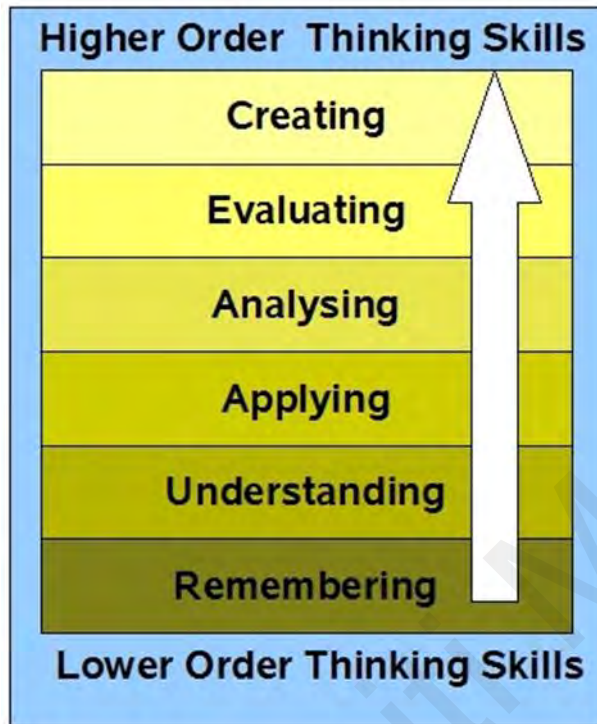


Figure 2.4: Bloom's higher-order thinking model

Bloom believed that learners should create learning concepts in their minds by attempting to solve the learning problem in their particular context. Then they can evaluate the problem and diagnose the required formation to solve the problem. As they attempt to collect data to solve the learning problem, they analyze the data to find the most relevant, which is later applied to the problem to find out if the problem can be solved. Bloom believed that such an endeavor could lead to understanding and, finally, long term retention. On the other hand, 'lower-order thinking' begins by presenting the knowledge to the learners (Krathwohl, 2002). The learners are asked to remember the given information, as it is believed that this leads to understanding. Later the learners can apply the knowledge and conduct analysis and evaluation based on the knowledge.

Both lower order thinking and higher-order thinking has been subject to criticism. Boud (1995) posits that knowledge acquired through lower-order thinking is subject to forgetfulness, and the learners forget about %90 of the information they acquire in this way. Hmelo-Silver (2004) asserted that traditional learning approaches do not prepare the learners with practical knowledge, and those learners who had experienced higher-order thinking can outperform traditional learners. On the other hand, higher-order thinking was criticized for being linear and unpractical to implement. As a result, the model was revised by Bloom and his colleagues, and 'creation' was added as a primary step before evaluation in the model. Also, the scholars in various fields of experiential learning, such as anchored-based instruction and PBL attempted to design practical and step by step models to implement the model. (e.g., Boud & Feletti, 1997; Hmelo-Silver, 2004; Hung, 2006).

As higher-order thinking was gradually becoming salient, several higher educational systems began thinking of implementing it in their curriculum. Lee and Kwan (2014) believe that Canada was one of the pioneers of PBL, where the curriculum was introduced at the Faculty of Health Sciences at McMaster University in Canada in 1969, though planning for this curriculum had begun in 1966. Indeed, medical education comprises both hypothetical deductive reasoning process and expert knowledge (Barrows, 1986, as cited in Savery, 2006), which breeds the expectation that hands-on experience would constitute a large part of the medical curriculum. By contrast, PBL stood out against the traditional lecture-based courses at the school, which consisted of long, exhausting lectures. The rationale was that despite the explosive growth in information in the field of medicine, students could only retain what they could experience within this growth of information. Also, excessive attention accorded to content was found to have caused negligence towards the teaching thinking strategies, which turned out to be a pitfall in traditional teaching approaches (Collins, Brown, & Newman, 1988). Therefore, PBL was

adopted to address the issue of knowledge impartment and retention faced by the medical school.

The McMaster group believed, however, that the problem should be presented first, engaging the students in the hands-on learning process, and that necessary knowledge will be gained through the solving of the problems. The new curriculum was in line with the educational belief of the time, which advocated intrinsically motivated learning, collaboration, and problem solving. Thus, in 1969, students enrolled in the first PBL classes, which deemphasized lectures and instead learned in small groups through a self-directed study guided by problems designed by their teachers. In the 1970s, Howard Barrows, a recent addition to McMaster, tweaked the model by introducing simulated patients in order to foster clinical reasoning skills. Barrows believed that the information and discovery boom of the time would render knowledge obsolete, and thus the focus should be on the acquisition of deductive and diagnosis skills.

The students' positive reaction towards PBL paved the way for this approach to be adopted by other medical schools, although slight alterations were observed in the way PBL was implemented in other schools. Among other educational settings that made use of PBL were Maastricht University in the Netherlands, the University of Newcastle in Australia, and the University of New Mexico in the USA (Camp, 1996). According to Hillen, Scherpbier, and Wijnen (2010), Maastricht began looking for an alternative to the traditional medical curriculum as students were not performing well during clinical and were struggling with the transition from theoretical learning to practical application. A visit to McMaster in 1969 left some of Maastricht's delegation impressed with PBL, and they soon offered their PBL medical curriculum in 1974.

Almost three decades after PBL was first implemented in Canada, a process was begun at McMaster University to find out how effective PBL has been. According to Lohfeld,

Neville, and Norman (2005), 17 graduates of McMaster University in the 1970s who had gone through PBL instruction were interviewed. The interview results showed that PBL approach has been successful compared to those who had gone to non-PBL medical schools.

2.5 From PBL to PBL

The success of PBL in the field of medical education saw other disciplines such as engineering, chemistry, physics, and geography; thus, scholars in these fields began using the approach (Larsson, 2001). Following these successes, Problem-based language learning (PBL) was used in language education. However, implementing PBL was found to be complicated. Indeed, defining a learning problem such as diagnosing an illness in the patients is easier than diagnosing a problem in language education (Larsson, 2001). In the case of language education, it was severer, as learning language as a tool and target could make the learning situation complicated. Therefore, among many disciplines which enjoyed PBL, language education is among the last ones. Only after the turn of the 21st century, the researchers became curious to find out about the effect of PBL on language learning. As a result, not only the literature on PBL and language learning is scant, but also most studies have not followed a model of PBL, which should be specifically designed for language learning. However, Larsson (2001) discussed the role of PBL tutorship in the teaching and learning of languages. Further studies were conducted on the effect of PBL on language learning (e.g., Aliyue, 2017; Ansarian, Adlipour, Saber, & Shafiei, 2016; Fard & Vakili, 2018; Fonseca & Martinez, 2017; Hashim, Selamat, & Sulaiman, 2014; Kassem, 2018; Mathews-Aydinli, 2007; Remedios, Clarke, & Hathorne, 2008; Shin & Azman, 2014), the consensus was that PBL could be a possible approach to language learning. However, many questions regarding its implementation within the

classroom have remained unanswered. Among these questions, the lack of a robust PBL model is to be answered.

Comparing PBL to principles of language teaching can also provide valuable insights. Long (2014) refers to the learners' freedom as a significant aspect of language learning that often occurs through Task-Based Language Teaching (TBLT). He mentions that while learners need to have freedom in learning, they should be guided appropriately. While this concept matches how learning occurs in project-based learning (Agudelo & Vasco, 2019), where the teacher is part of the learning task, in PBL guidance occurs in the form of feedback only after the learners have attempted to solve the learning problem (Hmelo-Silver, 2004). In this sense, PBL is different from TBLT. Long (2014) also mentions that the accountability and relevance of approaches to language teaching were under question in the 1980s; however, the advent of TBLT and more recent approaches to learning have considered relevance and accountability in the teaching approaches and the syllabus design. In line with many synthetic approaches to language teaching, PBL has a particular focus on the relevance of learning content to the learning objectives. Hung (2006), in his 3C3R model, considers the role of relevance in PBL education pivotal. The emphasis of PBL on self-directed learning (SDL) also reveals that the students are accountable for their education in PBL courses (Ansarian & Teoh, 2018).

2.5.1 Empirical Studies on PBL

Apart from non-empirical studies that have discussed the use of PBL in language classes (e.g., Larsson, 2001; Mathews-Aydinli, 2007), there have been researchers who have attempted to examine the effect of PBL on language learning. In almost all cases, these studies reported on effectiveness of PBL in language classes. For example, Aliyue (2017) attempted to solve the writing problems of Nigerian ESL language learners. The objectives of his study were twofold: a) to investigate the effect of PBL on Nigerian ESL

learners' metacognition, and b) to investigate the effect of PBL on the learners' writing. This mixed-mode study adopted a convergent-parallel design and was conducted on a class of 18 second-year university ESL learners for 12 weeks. Comparing the results of the metacognitive questionnaire administered before and after the treatment, significant improvements in the learners' metacognition was revealed. In addition, the participants' understanding of content, organization, vocabulary, language use, and other mechanics of writing had improved. However, whether or not the study was genuinely problem-based is obscure, given the absence of proper ill-structured problems.

Kassem (2018) endeavored to find out how PBL could affect speaking proficiency and motivation of Saudi EFL learners; thus, the researcher had designed a mixed-methods study and had compared the results of the control group (n=30) with the experimental group (n=30) before and after a Hybrid problem-based course. The study revealed that hybrid PBL could affect the speaking proficiency of the participants and their motivation as well; however, a detailed account of how PBL had been implemented in the study was not given.

Elsewhere, Fonseca-Martínez (2017) conducted a study in the context of Cajamarca, Peru, with 47 language students in an attempt to increase the talking time of basic-level language learners in the class. The author noted that the positivist present, practice, produce (PPP) model is time-consuming and is no longer the favored model in language classes. Therefore, there was a need for a new student-centered and meaning-based approach to language learning. Task-based learning (TBL), which is a form of communicative language teaching, was selected to achieve the goal of the study. The researcher believed that TBL is a form of PBL, "problem-based learning for language learning, i.e., task-based language learning" (p.46). However, the procedure of the study does not include the main features of PBL, such as problem-scenario, and emphasis on

higher-order thinking skills, instead the entire study was based on TBL. Although a detailed description of the TBL method used was not included, it concluded that TBL allowed for increased language learner talking time compared to the PPP model. The misconception that PBL and TBL are interchangeable, as explained in Chapter 2, has been observed in other studies as well, For instance, Hashim, Selamat, and Sulaiman (2014) also attributed the main features of PBL to TBL:

There are unique characteristics offered by TBLT approached, as stated by Larsson (2001), when he describes the advantages of TBLT. According to him, TBLT helps to:

- 1- Improve students' communicative skills.
- 2- Increase the general ability of social interaction.
- 3- Encourage students to gain a more profound sense of understanding.
- 4- Activate students to acquire the knowledge actively and not passive receivers.
- 5- Motivate students to learn in a way that the prospect of a final examination rarely manages to do. (p.3).

It should be pointed out that Larsson (2001) had attributed the features mentioned above to PBL, though it may also be true for TBL.

Although the focus of PBL in language classes has often been on productive skills such as speaking and writing, Lin (2017) conducted a study with 60 participants in the context of Taiwan on the effect of PBL on reading comprehension skills of language learners. The researcher designed a web-based English course for the PBL group, the results of which were compared to the non-PBL group. Both a posttest and a questionnaire

were administered to the participants at the end of the study. The results of the study revealed that the participants had enjoyed the online reading courses through PBL. Also, the experimental group learners outperformed the comparison group in terms of reading comprehension.

One of the studies that had focused on a unique feature of language learning in EFL classes through PBL was conducted by Bejarano Beltran, Perez, and Yucely (2016), who believe that social values that should be taught in the new context. One significant value, in the researchers' opinions, was how to deal with disrespect in social interactions. The ancillary purpose of the study was to teach English vocabulary. The researchers' made recruited 20 5th grade language learners in the South of Bogota, Colombia, as participants and made use of Morales and Landa's (2004) steps in implementing PBL. These participants' were presented with problem scenarios in which they were being disrespected in real life and were asked to suggest solutions to such problems. In addition, the researchers' observed that the learners' knowledge of vocabulary increased. Furthermore, it was found that the participants' social interactions were enhanced in quality. Thus the researchers concluded that PBL could be used as a tool to improve communication in language classes.

Another study that has focused on the effect of PBL on speaking proficiency was conducted by Sy, Adnan, and Ardi (2013). The researchers had selected descriptive speech as the main target of the study and attempted to find out how PBL can improve language learners' ability to describe people, things, and places. The researchers delved into speaking proficiency of 49 learners in Indonesia from 4 perspectives, i.e., pronunciation, fluency, grammar, and vocabulary. The findings of this experimental study involving pretest and posttest, which compared the results of the control group (traditional approach) against those of the experimental group (PBL), reported significant differences

between the participants speaking proficiency in two groups, with those in the experimental group demonstrating marked improvement.

Coffin (2013) believed that one of the shortcomings of the writing course offered at Mae Fah Luang University in Thailand is that it was highly individual-based and focused more on the written product rather than the learning process. The researcher attempted to restructure the writing courses in EFL classes using PBL. Throughout the study, the researcher delved into both learners' and teachers' perceptions regarding PBL. A total of 182 language learners and three language teachers participated in the study. The participants' were surveyed both before and after the study. Triangulation of data between teachers' perception through interviews, and learners' achievement in terms of scores revealed that PBL had a positive impact on learners' writing. Besides, it was found that the implementation of PBL had also motivated the learners to learn writing.

Another study was conducted in the Malaysian ESL context by Elizabeth and Zulida (2012), who attempted to investigate whether the application of PBL in English for Specific Purposes (ESP) classes can affect the learning of language. Twenty-five undergraduates, in their second semester, participated in the study. The researchers used an ontological approach to research and accorded focus on actions, behaviors, and actions as central points in the triangulation of data. Their data consisted of video recordings of the class interviews with and reflective journals from the participants, as well as the researchers' field notes. The results of the study revealed that PBL could be used in ESP courses to increase learners' knowledge of linguistic features related to specific language use situations. In addition, learners' cooperation with group members and confidence in learning was increased as a result of having been exposed to the PBL method.

In yet another study conducted in Thailand, Huang and San (2012) attempted to find out how undergraduate students perceive the use of PBL in language classes. The

participants in this study were 42 first-year undergraduate students who were interviewed using a questionnaire adapted from Marcangelo and Gibbon (2009). Although some students were dubious on whether PBL could affect their motivation to learn, the majority of them agreed that PBL had helped them to become more independent learners. The participants' also asserted that they had gained language learning skills through the use of PBL in their classes.

Hussain, Nafees, and Jumani (2009) focused on the effect of PBL on the learning of the English language by 8th-grade language learners in Pakistan. A total of 67 language learners took part in the study, wherein they were split into two groups: the experimental group (PBL) and the control group (lecture-based teaching). The researchers expanded on Lambros' (2002) concept of case-based problem-based learning and presented written cases to the learners. The researchers found that PBL affected language learning in terms of achievements within the target language. They also concluded that the participants had gained the abilities of analysis, synthesis, and evaluation.

Two separate studies were conducted in Singapore, one by Abdullah and Tan (2008) and another by Tan (2003). In the first study, the researchers were interested in examining how PBL can affect the learning of linguistic features of the language among 19 groups of students. Therefore, they designed asynchronous online conferencing forums, believing that this can increase the learners' cognitive engagement with the learning content. They concluded that not only could PBL increase participants' knowledge of linguistic features of the language but that it could also turn them into more self-directed learners. In the other study, Tan (2003) focused on the main features of PBL and endeavored to find out whether learners were familiar with these features. The focus of the study, therefore, was on three main features, i.e., ill-structured problems, facilitation, and problem-solving processes. Data was collected through interviews, surveys, and case

vignettes from 100 students. It was found that the lack of understanding of these features often resulted in the misapplication of PBL.

Another study was conducted in the Malaysian ESL context by Shin and Azman (2014). The researchers saw PBL as a potential approach for implementation in language classes and aimed to introduce it to the arena of Malaysian language education. They created collaborative learning groups comprising six learners and designed PBL language tasks based on Mathews-Aydinli (2007). Unlike many other studies, the authors revealed an example of the ill-structured problems used in the study. On a positive note, the study began the PBL implementation process by briefing participants on the approach. They found that Malaysian ESL learners and language tutors involved in the study had a positive perception of PBL.

On the other hand, a few issues should be pointed out in Shin and Azman's (2014) study. First, they placed the learners in groups of six despite recommendations of smaller groups in various literature. This situation places a burden on the tutor to ensure that no member is idle within the group. Secondly, the PBL process was broken up and spread over different sessions, which undermined the higher-order-thinking-skills process, which is most effective when completed in its entirety. Next, the feedback stage where language learners receive feedback from the tutor and their peers was moved to the end of the course, violating the principles of PBL and may have adversely affected the effectiveness of the approach. Finally, it should be examined if the question presented to the participants was ill-structured and unsystematic as required in PBL.

In the context of Malaysia, Othman and Shah (2013) targeted course content and language development as two main features of a language learning course and gauged the effect of PBL on these two variables in language classes. This experimental study was carried out with the participation of 128 language learners. The findings revealed that the

experimental group, in which problem-based tasks were implemented, outperformed the comparison group in terms of language development; however, in terms of course content, both groups showed similar progress.

2.6 Underlying Assumptions in PBL

As a learning approach that is influenced by some of the most recent findings in the field of educational psychology and education, PBL utilizes several theories. The role of higher-order thinking skills in PBL was already discussed. PBL stood against the information bombardment and exhausting unpractical sessions, which were common in many classes in traditional education (Lee & Kwan, 1996). Scholars in the field of PBL have realized that memorization does not lead to retention (Boud & Felletti, 1997). In addition, there was no defined role for the learners in traditional education to present their knowledge in practicum, and they were only expected to achieve high final scores. This situation, eventually, increases the negative washback effect of instruction, and focus on results rather than processes. Laufer and Hulstijn (2001) believe that learning requires engagement between learning content and learners' life; thus, a need analysis is required before defining any learning process. PBL is also based on an evaluation of a learning problem that is ill-structured and based on the learners' real-life scenarios; therefore, it can be assumed that the backbone of PBL is higher-order thinking. It should also be mentioned that various terminologies have been used in the literature, i.e., critical thinking, problem-solving, rational thought, so much that it is called a "conceptual Swamp" by Cuban (1984). As the model used in this study, among many other models designed in the area of PBL, has made use of Bloom's (1956) higher-order thinking model, his model is used in this study to refer to higher-order thinking.

Savery (2006) notes that teachers' should guide their learners through higher-order thinking. They should familiarize the learners with various tasks they should accomplish

in any stage of the process, i.e., evaluation, synthesis, analysis, application, comprehension, and knowledge. Evaluation of both content and situation is a significant first step to be taken by the learners in PBL tutorship. This situation requires providing the learners with the occasion to evaluate the learning content; as a result, ill-structured problems are used in PBL classes.

After having evaluated the problem, the students then prepare a plan for solving it whereby they identify necessary changes, alternatives, plans, and procedures, thus synthesizing a solution. Their understanding of the problem is taken to a deeper level in the next step – Analysis. Based on the nature of the problem, the members of the group may generate new ideas using the old ones, subdivide and organize the parts, identify patterns or attempt to predict the future (Kelly, 2017), or in other words, engage in Analysis. The students then apply their findings to new situations to assess the quality of their conjectures in the next step – Application. Application is the opportunity for the students to see their theories in practice, and as real-life situations may differ from theory, they may need to make changes to their speculations. Problem-solving skills are required in this stage, and tutors may facilitate the process by encouraging the development of said skills.

This process results in comprehension, which is associated with explanation, interpretation, and description of the newly learned content (Truschel & Deming, 2007). Comprehension is the reward of an in-depth understanding of the problem, which was dealt with through the steps mentioned above. Finally, at the end of the process, the desired knowledge is acquired. PBL has the added advantage of engaging the student throughout the learning process, simultaneously teaching them crucial critical thinking skills. As such, it is believed that this hard-won knowledge will remain with the student, unlike that which is obtained through the traditional approach.

It should be mentioned that Bloom's higher-order thinking model was criticized for being linear and impractical (Krathwohl, 2002). However, the model has survived and been used since its inception, which can indicate the practicality of the model. On the other hand, failing to implement all steps of the process may result in a partial effect. This failure might be the reason some scholars criticized the model.

Another significant feature in PBL is collaboration. Learners in PBL are required to cooperate with other learners at various stages of the process (Azman & Shin, 2014). Although they are asked to attempt to evaluate and analyze the learning problems individually at the beginning of the learning process, they should discuss their thought with their friends and plan on how to solve the problem (Hmelo-Silver, 2004). Moreover, after the learners present their learning outcome to the class, other peers are asked to provide them with feedback.

Indeed, PBL accords with Vygotsky's (1987) zone of proximal development (ZPD). ZPD was suggested by the Soviet Union psychologist Vygotsky (1987), who believed that effective learning occurs in both the unaided zone (learning on one's own) and the aided zone (learning with the help of others). Two main processes that facilitate the implementation of ZPD in the PBL approach are the feedback and peer work. Both the tutor and peers are involved in the feedback process. As a result, integrating group work into the learning task allows the learners to employ other group member's ideas, and this, in turn, can foster learning.

Constructivism is rather a philosophical paradigm than a theoretical background in PBL (Jones, 2008). Educators in a PBL process should be aware that unlike the positivist view, which considers reality as fixed and observable, PBL seeks answers as they are constructed and formed in the minds of the learners (Savery, 2006). Therefore, answers may be different among different groups of students or even individual students in the

PBL approach. There are no right or wrong answers to the questions, and all answers can be accepted as long as they can solve the problems. This view is mostly congruent with the constructivist view of education.

The 20th century witnessed the birth of many language teaching approaches and methods in the search for the most suitable one. The end of the 20th century saw the death of the method era and the emergence of the post method era. According to Kumaravadivelu (2006), the concept of the post method era was brought into existence to solve some of the main problems associated with previous approaches and methods such as a) the marginalized role of the teachers, b) the passive role of the learners, c) the ignorance towards culture, language context, learning styles and teaching styles, and e) the prescribed activities. In congruence with the presumptions of the post method era, PBL attempts to highlight the role of learners in the learning process (Elizabeth & Zulida, 2012). This process should include taking into consideration their ideas, approaches to solving problems, and cognitive skills. Similarly, cultural and social context play a part in PBL (Coffin, 2013). The problems presented within the PBL approach are based on real-life situations, meaning that culture and social context are integrated into the problem. While some language teaching methods limit the role of teachers to robots expected only to impart information, the educator in the PBL approach act as facilitators who are encouraged to use their creativity in guiding the students through the learning process.

Our increasingly globalized world is bringing people from different parts of the practice of different beliefs and cultures. In order not to offend one's international colleagues, it is crucial to both respect and understand their cultures. Many linguists believe that culture is inexorably linked to language education. Thus it is expected that one should learn the target culture as well as the language to be considered a successful

communicator. PBL aims to make the learning of the culture part of language learning (Coffin, 2013). As culture is often entangled with real-life problems, language learners should not dissociate from the target culture when learning a new language. In fact, they should integrate these cultural problems into the language class for a better understanding of the language and its underlying culture. Cross-cultural differences may hinder the learning process at some point, but the tutors may attempt to facilitate the process by giving notes about the target culture through feedback. Given that culture is at the core of globalization; therefore, it is natural that PBL is affected by and must take into account globalization and all that it entails.

Technology has advanced immeasurably in the last two decades, and one of the most common ways of finding answers is by going online and googling it. Likewise, PBL, a real-life inquiry-based approach to learning, is primarily associated with the use of internet and technology. Indeed, students do search through a variety of sources to find the answers to their questions. These sources include but are not limited to, books and other printed sources, peers within the group, and online sources. It has been observed in implementing PBL in language classes that smartphones and the internet are among the most preferred tools used in searching for information. PBL has the potential to blend technology to the classroom to enhance learning and can thus be considered as a blended learning approach. Having conducted studies on PBL in the last four years, we realized that mobile-phones play a significant role in conducting PBL classes so much that PBL can be considered as a form of Mobile-Assisted Language Learning (MALL). We found mobile- phones to be the main search tool for the learners and an integral part of the PBL process. Mobile phones reduce the cost of PBL classes considerably, as, without them, learners should be provided with laptops or other devices for the online search.

In order to discuss ill-structuredness in PBL, the notion of systematicity should be discussed first. Hung, Jonassen, and Liu (2008) posit that systematic problems such as puzzles can be solved through algorithms and usually have only one correct answer. However, unsystematic problems are more similar to learners' real-life (Hmelo-Silver, 2004) and have more than one correct answer. The main criteria for finding out whether or not the answer is correct is the extent to which the answer can solve the problem. Learners are required to utilize their cognitive and metacognitive thinking skills to solve the learning problems; thus, if the learning problem is made simple, there would be no need to analyze the problem, and it becomes easier for the learners to find the answer without the required engagement. Jonassen (2000) notes that there should be a relationship between the learning problem and the learners' cognitive level. The learning problems should neither be too easy or too difficult for the learners. The level of ill-structuredness of a learning problem should correspond to the learners' cognitive level.

Traditionally, problem-based learning has had its focus on the social dimension of learning. Among primary uses of PBL in medical sciences, for example, was to prepare physicians who could communicate with the patients and diagnose their illnesses (Lee & Kwan, 2014). Abdullah (1998) also acknowledges that PBL is a suitable approach to increase the learners' communicative skills, as most learning in PBL occurs through oral communication. Learning is asked to interact with each other and with the outside world through online and paperback sources. Although this might indicate that PBL is more suitable for increasing learners' speaking proficiency, recently researchers have been conducting on the effect of PBL on other language skills and subskills such as the writing skill (Aliyue, 2017), vocabulary learning (Fard & Vakili, 2018), and language assessment (Ashraf, Ahmadi, & Domskey, 2017), and the results have been promising.

2.7 EFL Situation in Iran

Learning English in the context of Iran occurs in both the public section and the private sector. As the focus of the study is on the EFL situation in the context of private language institutions, only a brief description is given about the EFL situation in the public sector. Each sector is discussed in terms of teaching and learning methods, learning materials, teachers' training, and overall success.

2.7.1 The Public Sector

The educational policy of Iran was for limiting the use of English in Iran after the Islamic revolution in 1979 (Borjian, 2013). English was known as a tool for the exploitation of the country by the West and was removed from primary schools in Iran in the 1980s. In such a situation, significant aspects of language learning, i.e., the curriculum, the learning content, and the teaching methods were affected by the new anti-Western policy in education. Borjian (2013) also remarks that teaching of English in the context of Iran centered on transmitting Islamic values and teaching and learning strategies that were congruent with this overall objective. Ignoring the speaking skill, the teaching of reading as the most useful language skill through Grammar-Translation method (GTM), conducting the classes in the first language (L1), and ignoring productive language skills are among other features of language learning in the public sector in Iran which can still be, more or less, observed (Riazi & Mosalanejad, 2010; Jahangard, 2007).

Farhady, Hezaveh, and Hedayati (2010) also note that although many countries have decided to move in the direction of globalization, Iran has preferred its national unity and has limited its sister-ship relationship with American or European educational contexts. The overall consequence of such policies has been very harmful to the language learners in the public sector to the extent that many researchers have acknowledged inability of

the public sector in enhancing the language learners' language knowledge and speaking proficiency (Nasrollahi Shahri, 2018; Pishghadam, Askarzadeh Torghabeh, & Navari, 2009; Razmjoo, 2007).

The public sector in Iran is also suffering from the negative washback effect (Salehi, & Yunus, 2012). The language learners should pass the university entrance exam after the tertiary level; as a result, they limit themselves to learning the test content and leaning of vocabulary and grammar in a non-communicative manner (Razmjoo, 2007). Vocabulary items are presented to the learners in wordlists, and grammatical structures are taught explicitly and deductively (Akbari, 2015). Due to the absence of the speaking tasks, there is no emphasis on pronunciation and fluency, and communicative success is not set as an objective in the public sector.

2.7.2 The Private Sector

As the focus of this study is on oral proficiency, studying the context of private institutions seems more suitable.

There is no resource stating the exact number of private language institutions in Iran; however, it can easily be observed that these centers are growing quantitatively, as many Iranian youngsters turn to these centers to learn English. Chalak and Kassaian (2010) believe that Iranian EFL learners have both integrative and instrumental motivations for learning English. Iranian EFL learners have shown tendencies in learning foreign culture and also see language learning as a requirement for immigration. Zamani (2015) defines this situation as westernization in Iran and explains that Iranian youngsters favor Western culture and would like to be integrated into Western culture.

The main components of the Iranian EFL classes are the teachers, the learners, the learning materials, and the teaching and learning methods. Iranian EFL teachers come

from various walks of life. While native language teachers do not tend to work and live in Iran, people from various professions teach English in private language institutions. The teachers then may not have been educated in the field of language teaching and learning, but they are obliged to pass a teacher training course. This issue is subject to controversy in the EFL context of Iran, yet the overall trend has not been changed.

Iranian researchers have attempted to improve the EFL situation by studying EFL teachers in Iran. The main trends in research on Iranian EFL teachers' search on EFL teachers' critical thinking (Moslemi & Habibi, 2019; Sabah & Rashtchi, 2017; Sarani, Najjarbaghseyyah, & Vaezi, 2019) identity (Ghanizadeh & Ostad, 2016; Labbaf, Moinzadeh, & Dabaghi, 2019) and beliefs and characteristics (Ghavamnia, 2020; Moradkhani, Raygan, & Moein, 2017; Gilakjani & Sabouri, 2017). For example, Ghavamnia (2020) studied the teachers' beliefs and perceptions about teaching culture. Through studying 10 Iranian EFL teachers, they realized that Iranian EFL teachers have accepted to teach a foreign culture but have problems in successfully teaching foreign culture. Hassani, Khatib, and Yazdani Moghaddam (2020) delved into Iranian EFL teachers' identity and practiced Kumaravadivelu's Language Teacher Education Modular Model with 10 Iranian EFL teachers. Later they realized that the teachers used more macro-strategies while teaching and had a shift from the uncertainty of practice to the certainty of practice. The consensus among many recent studies is that the EFL teachers' situation in the context of Iran has improved. They are more aware of the teaching strategies, have accepted the English culture, and implement it in their classes.

Although CLT is known to be one of the most dominant language teaching methods in Iran, in the private sector (Khatib & Tootkaboni, 2019; Koosh and Yakhabi; 2013), the language institutions have the freedom to select their teaching method. The teaching method also depends on the learning material. Mozaffarzadeh and Ajideh (2019) state

that one of the reasons intercultural competence is neglected in the EFL context of Iran is that it is not implemented in the ELT textbooks.

2.8 Mobile-Assisted Language Learning (MALL)

The advent of mobile phones in the 1970s and their advantages such as wireless communication, Global Positioning System (GPS), and instant messaging service (SMS) has made mobile phones a suitable device for learning in various disciplines (Miangah & Nezarat, 2012). Recently and with the latest mobile applications such as WhatsApp, Telegram, Viber, Amigo, communication has been even more accessible. These mobile-phone applications offer free-of-charge services and provide users with voice and video messages.

Unique features of mobile phones and their capacity to be used in language learning have accorded the focus of many scholars to learning through them to the extent that many studies have been conducted on the effect of MALL on language learning. Sharples (2006, p.24) notes that: "mobile-assisted language learning characterizes the use of personal, portable devices that enable new ways of learning, emphasizing continuity or spontaneity of access and interaction across different contexts of use." Afzali et al. (2017) reviewed 30 recent studies that had been conducted on MALL and language learning in the last five years. In another study, Burston (2013) accorded focus to studies that had been conducted in the arena of MALL between 1994 and 2013. These two review studies had taken vocabulary learning through MALL into consideration. Elsewhere, Stockwell (2012) noted that mobile-phones are among the most suitable device to provide language learners with the learning content. The success of mobile phones in the field of education and language learning has encouraged many teachers to use them as a learning tool to the extent that Pęcherzewska and Knot (2007) reported that mobile phones are the most frequently used learning device in Europe. Kukulska- Hulme (2012) also remarks that

mobile phones have solved many problems that traditionally existed with technology-based instruction. For example, the low quality of audio files recorded on cassette had marginalized the use of cassette players in listening and speaking courses; however, the advent of mobile-phones effectively solved the problem so much that many distance language learning programs such as the one presented by Open University in the UK are delivered through mobile-phones.

2.8.1 MALL: A Brief History

Before discussing mobile-assisted language learning (MALL), it seems timely to discuss mobile learning (M-learning). Teaching and learning approaches have undergone many changes in recent years; however, in the previous years, they were restricted to traditional classroom settings in which the learners had to enter the physical atmosphere of the classroom to be able to learn. These forms of learning had specific characteristics. First of all, in most cases, classes were lecture-based (Beale, 2007) and teacher-centered (Klopfer, 2008). The learners formed only one aspect of the learning triangle, and the other angles of the triangle, i.e., learning content, and teachers were out of their control (Tan, 2003). As a result, they had no role in selecting the materials. Also, learning was one-way, and the learners were not supposed to be autonomous entities who take charge of the learning process. These learners did not have access to authentic knowledge beyond the boundaries of the classroom and only dealt with pre-defined materials.

However, the amendments to learning processes have affected learning approaches, especially in the last 50 years. Firstly, the movement from positivist to social constructivist philosophy in learning which changed the underlying concept of learning and the view over reality (See Creswell & Zhang, 2009). Secondly, the advent of technology-facilitated implementation of new learning approaches based on the philosophy mentioned above.

The shift to new schools of thought required more adaptive and complex teaching, learning, and assessment techniques and instruments. As a result, technology came into play. Many of the complexities of classes were handled with audio and video materials. For example, the authentic language use was depicted to the language learners through films in the 80s (Secules, Herron, & Tomasello, 1992). Along with the new expectations in the field of education in general, and language education in particular, technologies used in classes were evolved. The promising consequences of technology-based instruction resulted in many teachers and learners believing in the use of technology to amend learning processes to the extent that today technology's role in language learning is undeniable. The technology was also used to fulfill the long-lasting dreams of educators. One aspect of this issue was distance learning, which would not have been possible without the utilization of technology (Bernard et al., 2004).

Although traditionally, video and audio players, faxes, and emails were among the highlights of technology, the role of mobile phones in recent technology-based learning is undeniable. Despite some disadvantages, such as the small size of the screen, mobile phones are ubiquitous, personal, high-tech. Also, they are equipped with software and applications that can facilitate learning (Martiz, 2015). As a result of these advantages, mobile phones were used in various disciplines to deliver education. Recently several applications have been developed specifically for learning purposes in various disciplines, among which Medcalc and Lexicomp in medical education and SpaceChem in the field of engineering can be mentioned.

Learning through mobile applications is not confined to specialized learning applications. Many teachers and learners use usual mobile apps such as Telegram, WhatsApp, and Instagram for learning purposes. The bulk of studies dealing with this issue shows not only the interest of the researchers in the particular field of research but also the

capabilities of mobile-based learning (Martin & Ertzberger, 2013). The advantages of mobile phones were not disregarded with scholars in the field of language learning, and research has been conducted concerning mobile-assisted language learning (MALL) in recent years. Kukulska- Hulme (2012) divides these studies into those dealing with the learning content and those dealing with the course design. In the case of content-related MALL, Petersen and Divitini (2005, p.169) state that: "Little or no emphasis is given to providing learning support where the learner can interact with other learners or parties that can support the learning process." As for design-related MALL, Petersen and Divitini (2005) note that unlike traditional approaches to teaching in which content is presented to the learners by the teachers, these approaches to learning aim at fostering learning and guiding the learners to find the learning content.

The mobile-assisted PBL treatment phase in this study, which was used with the experimental group participants, is considered both a strategy-related and content-related form of MALL. The researcher aimed at providing the learners with technology so that they could interact with other learners and also design a course in which the learners could search for the learning content on their own.

2.8.2 Mobile Phones

Though mobile phones were designed solely as portable communication devices, their recent technology and enhancement have astonished their users. By using mobile phones, users can have access to the internet, send video and voice messages, and keep a record of their conversations. Users can socialize, give, and receive feedback on their friends' opinions, and share information. New applications such as Telegram give the users the ability to communicate in both the oral and written form. Scholars used such features (e.g., Chauhan, 2017; Heflin, Shewmaker, & Nguyen, 2017; Sarrab, Al Shibli, & Badursha, 2016) to justify the utilization of mobile phones for pedagogical purposes.

In terms of language learning, these features can be very useful. For example, access to the internet can result in the availability of authentic material for learning, a necessity for many EFL contexts (Godwin-Jones, 2017). On the other hand, instant communication services, either oral or written, can result in practice opportunities for the learners. Mobile- phones can even result in distance language learning (Kukulska- Hulme & Viberg (2018). Some scholars have criticized the use of mobile phones for learning purposes. For example, Lin and Lin (2019) note that mobile phones' small screen is not suitable for learning; however, it can be used for reviewing and practicing. Elsewhere, Zou, Yan, and Li (2020) have criticized the poor audio quality of mobile phones. They made these conclusions by studying the use of mobile phones in language classes in Japan.

Although the use of mobile phones as a learning tool has been criticized, the results of studies on the effectiveness of MALL have been promising (Afzali et al., 2017). Besides, these studies have paved the way for improving mobile phone technology and rectifying the problems. However, most studies that have made use of mobile phones have accorded focus on vocabulary learning through MALL. As a result, this study focuses on another aspect of this different learning tool and investigates its effect on the spoken intelligibility of the learners.

2.8.3 Telegram Application

Mobile-phone applications used to facilitate communication among people vary in style, characteristics, and public acceptability in a particular context. In the context of Iran, Telegram is the most widely accepted social media used by many individuals. Telegram is similar to many instant messaging services, as it is a cloud-based and a voice-over service (Bloomberg, 2018). Based on Telegram's official website (2014), Telegram is available for a variety of users who use Android, Windows, iOS, and Linux.

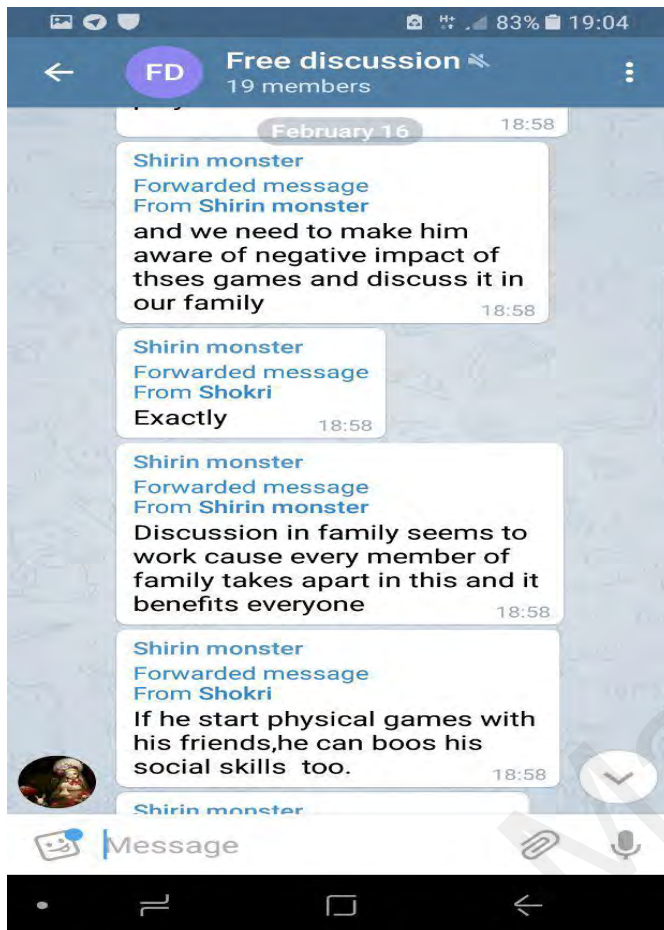


Figure 2.5: Sample Discussion Page on Telegram

Bengali and Mostaghim (2018) note that Telegram is the most popular social media application, with over 40 million users (more than half of the population) in Iran. They also report that the popularity of Telegram in Iran has made it the fastest method of sharing even official news among employees in the organizations in Iran. Unique features of Telegram application include:

- 1) Synchronous text, video, audio messaging,
- 2) The ability to create online groups or channels,
- 3) The ability to delete and modify messages,

- 4) The ability to install a bot (application) to help control the group or channel (e.g., automatically delete abusive language),
- 5) Flexibility in designing a wide range of online stickers,
- 6) Being user friendly,
- 7) The ability to share online links and data.

Each of the features mentioned above can be of interest to language educators, as they can help facilitate the online language learning processes. For example, the ability to send various forms of messages, i.e., text, audio and video without worrying about possible mistakes made (as they can be deleted) is very helpful to language learners to the extent that Zheng, Young, Brewer, & Wagner (2009) introduced Telegram as a suitable supplementary tool in language learning. However, studies dealing with Telegram application and language learning, both in the global context and Iran, are scant. Most previous studies have focused on WhatsApp application (Burston, 2013), and few studies, if any, has taken Telegram into account. This issue urges the need to investigate language learning through Telegram application in Iran.

2.8.4 Past studies Using MALL

In recent years MALL has become an inseparable part of many language classes. As a result, many languages learning mobile apps and learning materials have been designed (Chen, 2013). In line with this pervasive use of MALL, numerous studies have been conducted at the MALL. As it is impossible to present all these studies in this section, the focus of this section is to present studies that focus on various aspects (categories) of MALL through Telegram. It appeared that many of these studies had been conducted in the context of Iran, which should be due to the pervasive use of the Telegram app among

Iranians. The consensus among previous researchers is that Telegram can affect learning English in the EFL contexts from many perspectives, including vocabulary learning, increasing accuracy of pronunciations, and the writing skill.

Stockwell and Hubbard (2013) discuss the distinguishing physical, pedagogical, and psycho-social dimensions of MALL in an attempt to justify both its merits and limitations. They define ten principles for successful implementation of MALL including:

- 1) Distinguishing the affordance and limitations of the mobile devices,
- 2) Limiting multitasking,
- 3) Respecting the boundaries of the learners,
- 4) Maintaining equity in a formal language learning setting,
- 5) Acknowledging the language learners' differences,
- 6) Cultural awareness,
- 7) Using of short and succinct tasks,
- 8) Rapport between the language learning task and technology,
- 9) Providing the learners with training, and
- 10) Recognizing multiple stakeholders.

These principles presented for using MALL were concluded based on numerous studies conducted in the field of MALL in previous years (e.g., Chapelle, 2001; Doughty & Long, 2003; Herrington, Herrington, & Mantei, 2009; Ophir, Nass, & Wagner, 2009; Reinders & Hubbard, 2013; Stockwell, 2013). While some studies have discussed the

merits of new technologies that aid language learning (e.g., Godwin-Jones, 2017; Xodabande, 2018), some other studies have observed the effect of these technologies on mechanical aspects of writing. For example, Ngesi et al. (2018) attempted to make use of mobile phone technology to increase the contact time between teachers and students in the context of Africa. Through studying 44 grade 9 English learners, they realized that SMS and Mxit texts affect the participants' spelling, punctuation, acceptable grammar, and accurate sentence use. Similar results were gained by Andujar (2016), who attempted to realize how MALL affects writing in the second language. He designed a study with 80 Spanish students who participated in his study for six months. After the treatment, the writing abilities of the control group learners and the experimental group learners were compared, and it was understood that experimental group learners had more improvements in terms of lexical, grammatical, and mechanical aspects of writing.

Kukulska- Hulme and Viberg (2018) looked into the role of MALL in creating collaboration among the students. To do so, they reviewed several papers published between 2012 and 2016. They understood that some features of mobile phones such as flexible use, timely feedback, and active participation could enhance collaborative learning of the second language. They also realized that activities such as game-based learning could foster collaboration.

Ma (2017) conducted a multi-case study to find out how MALL affects thirty Hong Kong university students' L2 learning. Based on the results, i.e., distinctive features and attributes that form their personalized learning approaches, they designed a socio-cultural framework to study MALL. The main features of his socio-cultural model were L2 agency, personalization, tools, knowledge, communications, and entertainment.

In a recent study, Xodabande (2017) studied the effect of MALL on learning pronunciation by using Telegram. His study had a between-subject design, and 30

participants participated in the study in both the control group and the experimental group. The researcher realized that Telegram is a suitable tool to enhance EFL learners' pronunciation. Therefore, Xodabande (2017) advocates the use of social media usage in language teaching and learning processes.

Another study that has made use of Telegram in language classes is that of Naderi and Akrami (2018). They made use of 147 language learners to find out how language learning through Telegram affects their reading comprehension and whether or not this effect is different between male and female language learners. After implementing 12 reading passages through Telegram, they realized that Telegram is a more suitable tool to practice reading comprehension compared to conventional language classes. Besides, they did not observe any difference between the results of the main and female participants.

In another recent study, Aghajani and Adloo (2018) focused on the effects of language teaching through Telegram on Iranian EFL learners' writing skills among 70 Iranian ESP learners. After comparing the results of face-to-face cooperative writing groups to teaching through Telegram, they realized that Telegram writing groups have a slightly higher score with no statistically significant difference. The researchers also looked into the effects of treatment on the sub-constructs of writing and realized that writing performance, content, organization, vocabulary, language use, and mechanics were positively affected.

Heidari Tabrizi and Onvani (2018) studied the impact of English language teaching through Telegram on vocabulary learning of 30 Iranian EFL learners in a quasi-experimental study. Similar to Aghajani and Adloo (2018), they compared the experimental group to face-to-face interaction. They concluded that social media, especially Telegram, is a suitable tool to learn vocabulary.

2.9 Speaking Proficiency

Speaking is by far the most common means of communication. Ounis (2017, p.96) states that speaking has many functions, among which the following can be highlighted:

- 1). Personal – expressing personal feelings, opinions, beliefs, and ideas.
- 2). Descriptive-describing someone or something, real or imagined.
- 3). Narrative – creating and telling stories or chronologically sequenced events.
- 4). Instructive – giving instructions or providing directions designed to produce an outcome.
- 5). Questioning – asking questions to obtain information.
- 6). Comparative – comparing two or more objects, people, ideas, or opinions to make judgments about them.
- 7). Imaginative – expressing mental images of people, places, events, and objects.
- 8). Predictive-predicting possible future events.
- 9). Interpretative – exploring meanings, creating hypothetical deductions, and considering inferences.
- 10). Persuasive – changing others' opinions, attitudes, or points of view, or influencing the behavior of others in some way.
- 11). Explanatory – explaining, clarifying, and supporting ideas and opinions.
- 12). Informative – sharing information with others.

Many factors can contribute to successful oral communication. Many of these distinct speaking particularities are different from macro English skills. For example, Hughes (2002) focused on oral discourse features of speaking proficiency, Brown (2004) considered pronunciation, intonation, stress, and idioms as significant factors of the speaking proficiency, and Harmer (2007) highlighted the role of body gestures and expressive language. Some scholars further explain that strategies the speakers adopt, such as taking turns in speaking and attempting to be involved in the conversations, also affect the speaking proficiency of the speakers. Such distinct views about the speaking proficiency and its components have made it, as stated by Bailey & Savage, (1994), among "the most demanding of the four skills" (p.7).

In the field of English language teaching (ELT) and English language learning (ELL), the views of the scholars slightly differ. Stiggins and Bridgeford (1985) remark that speaking proficiency in language classes is mostly gauged based on the learners' performance and by the teachers. This has led to what is known today as communicative assessment (Bachman, 1990). Luoma (2004) explains that in such a performance-based form of assessment, the examiners wish to encounter meaningful output produced by the learners; thus, they consider several rubrics for oral assessment.

The review of studies conducted on speaking proficiency shows that various aspects of these multifarious language skills have been taken into account by different scholars. However, it seems timely to discuss the concept of proficiency to better understand speaking proficiency, as it is among the fundamental concepts to grasp. The models and theories which have discussed second language proficiency differ in some aspects; as a result, there is some debate over what to accept as proficiency. Canale and Swain (1980) and Bachman (1990) are among the first who have discussed proficiency. Even the

definition proposed by these scholars is very similar to the one stated by Chomsky (1965, as cited in Hymes, 1972), who attempted to distinguish 'competence' for 'proficiency' by referring to proficiency as the actual use of the language in a concrete situation.

At times, the data collected through empirical studies are used as the basis for such discussions. Some scholars run their language proficiency tests and then compare the results with highly validated and reliable tests such as TOEFL iBT to find the extent to which their test is acceptable. An example is a study conducted by Iwashita, Brown, McNamara, and O'Hagan (2008), who designed a speaking test and compared the results with TOEFL iBT results. Their study, however, was conducted with students in an English for Academic Purposes (EAP) course.

2.10 Summary of the Chapter

This chapter began with the presentation of the main theories used in designing the PBL model used in this study. Next, problem-based learning, its history, and its main features were elaborated on. The researcher also presented a number of studies that have been conducted in the field of problem-based language learning. Next, the researcher elaborated on the issue of mobile-assisted language learning (MALL) and its advantages. More specifically, the researcher explained how recent social applications, such as Telegram, have facilitated communications among users and how these features could be used to enhance PBL tutorship.

In the next phase of the chapter, the researcher reviewed a number of models that have already been used to assess the speaking proficiency of the language learners. Based on the review of the models, a model was suggested and implemented in this study to score the speaking skill.

CHAPTER 3: METHODOLOGY

3.1 Introduction

The third chapter of the study deals with issues related to conducting the study. Along with that, the participants and setting are explained in detail. Other significant issues explained in this section are instrumentation, validity and reliability, and procedure of the study.

3.2 Research Design

This study aimed at understanding whether or not mobile-assisted PBL had any effect on the speaking proficiency of Iranian EFL learners. Therefore, the main rubrics of oral assessment, as suggested by the public version of IELTS speaking test, were taken into account. These rubrics included the accuracy of grammatical structures, fluency, pronunciation, vocabulary, and task achievement. Also, the views of the language learners in PBL tutorship (the experimental group) were explored; thus, the participants in the mobile-assisted PBL group were interviewed. Figure 3.1 represents an overview of the variables in the study.

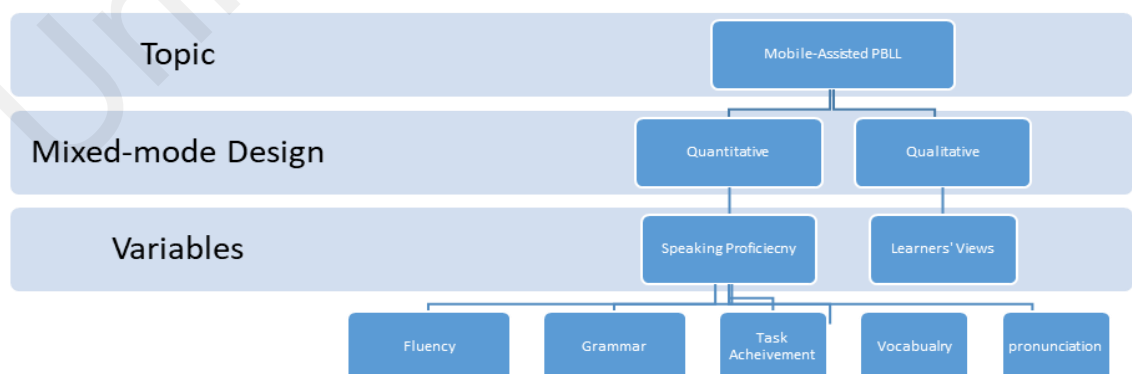


Figure 3.1: Design of the study

This study has a fixed mixed-method design, as the design was fixed and determined before conducting the study. Ras (2009) explained that unlike 'emergent mixed-methods design' in which the need to add a qualitative or quantitative section is perceived during the process of the study, implementation of both qualitative and quantitative sections are predetermined in fixed mixed-methods studies. Thus, the answer to research questions 1 and 2 was gained through quantitative data analysis, and the answer to the last research question was explored qualitatively. Opting a mixed-method design could overcome the shortcomings of quantitative and qualitative studies in isolation. Creswell and Clark (2017) state that quantitative research is weak, as it does not take into account the context of the talks and the voices of the participants. Due to not discussing personal biases, quantitative studies may be inadequate (Creswell & Clark, 2011). On the other hand, qualitative studies alone are deficient; due to personal interpretations of the researchers (Creswell & Clark, 2017). Moreover, Creswell and Clerk (2011) note that the findings of the qualitative studies are not generalizable; however, as mixed-methods studies have a quantitative section, it is possible to generalize the findings of the mixed-methods studies.

In this study, a confirmatory sequence design was selected. Creswell and Clark (2011) explain that confirmatory sequence design is implemented when the researcher implements the qualitative strand to support quantitative findings. The strands are kept separate during the data analysis, but the results are mixed in data interpretation. The objective of using mixed-methods design was to enhance the findings of the quantitative section through qualitative data analysis; thus, complementarity was the purpose of this mixed-methods design.

In addition, this is a longitudinal study as it had a treatment phase that lasted for 16 sessions. The main dependent variable is speaking proficiency, which was investigated in terms of task achievement, vocabulary, the accuracy of grammatical structures,

pronunciation, and fluency. The independent variable is the effect of mobile-assisted PBL.

3.3 Philosophical Paradigm

The underlying framework in this study was pragmatism, as the study is mixed-method. The researcher could not consider reality as it is by positivist; neither could the researcher consider reality solely as the participants underpin it. Thus, the focus of the study was on the impact of the research rather than the presumptions of the researcher. Creswell and Zhang (2009) also posited that pragmatism represents the philosophical underpinnings of mixed-methods research.

Considering pragmatism as the underlying assumption of the study, the researcher attempted to reduce biases in conducting the study. Pragmatism is a paradigm which emphasizes on not having presumptions about the results and making conclusions only based on what is gained as a result of the study. To do so, the researcher had three primary considerations. Firstly, although the participants were informed that they were involved in a study through the consent forms, they were not told whether they were in the control group or the experimental group to avoid subject expectancy. Secondly, the raters who were in charge of rating the pretest and posttest audio files were not informed of the grouping of the audio files, i.e., control group vs. experimental group to avoid rater expectancy. Finally, the themes extracted from the semi-structured interviews, along with the transcriptions, were sent back to the respondents for confirmation (member checking), and the quantitative data were directly based on the scores achieved by the participants.

3.4 Participants and Setting

3.4.1 Setting

This study was conducted in the context of Tehran, Iran. Tehran is the capital city of Iran, with a population of over 10 million people. Persian is the official language of the country and L1 in the context of Tehran, while some other cities have different L1. Through non-random sampling and by considering that Persian is the official L1 in Iran, this study was conducted in the context of Iran.

This study was conducted in the Safir Language institute in the city of Tehran. Safir is a popular and widespread network of language classes in Iran. It has over 18 branches in the country. There are several reasons for selecting Safir as a setting for this study. Firstly, the researcher wished to conduct this study in the Iran Language Institute (ILI), which is the largest network of language classes in Iran; however, after negotiating the procedure of the study with the ILI educational team, the head of ILI did not agree with conducting the study. Thus, the researcher conducted the study in another educational system, which was also widespread and affordable for the majority of the language learners. As Safir was a possible avenue for conducting this study, the researcher opted to conduct the study in Safir. The consent form by the head of the institute to conduct the study is attached (Appendix F) Secondly, Safir has modest tuition fees for the learners; therefore, many families with various financial status in Iran can attend the language classes.

After an informal interview with the head of the research and development section (R & D) at Safir, it was found that Safir is currently using the communicative language teaching (CLT) method as the main method of language teaching and learning. The Headway series authored by Soars et al. (2010) are used in all branches of Safir. As the

students finish the intermediate level at the center, which should typically take about two years, they should take part in a free discussion class. The material of the free discussion class is based on the topics covered in previous semesters; however, the language learners are given more chance to practice the language orally. The participants at this level (free discussion class after the intermediate level) were targeted for this study. All participants were interviewed twice throughout the study for confirmability of data. The respondents' views in both interviews (in the middle of the course and at the end of the course) were compared. In case any inconsistencies were found, the respondents were contacted and were asked to clarify.

3.4.2 Student Participants

Power analysis was run to find out about the required number of participants for this study. Through power analysis, it was revealed that 31 participants are required in each group to achieve the purpose of the study. Moreover, as it was likely to face the attrition effect during the study, the researcher began the study with 40 participants in each group. Eventually, 33 participants in the control group and 37 participants in each experimental group continued to the end of the study.

To conduct power analysis, the researcher defined within interactions repeated measures ANOVA (MANOVA) as the main type of required analysis. Power was set to 0.90, and the effect a moderate to strong effect size was targeted. Figure 3.x shows the power Analysis. Figure 3.2 shows the power analysis results.

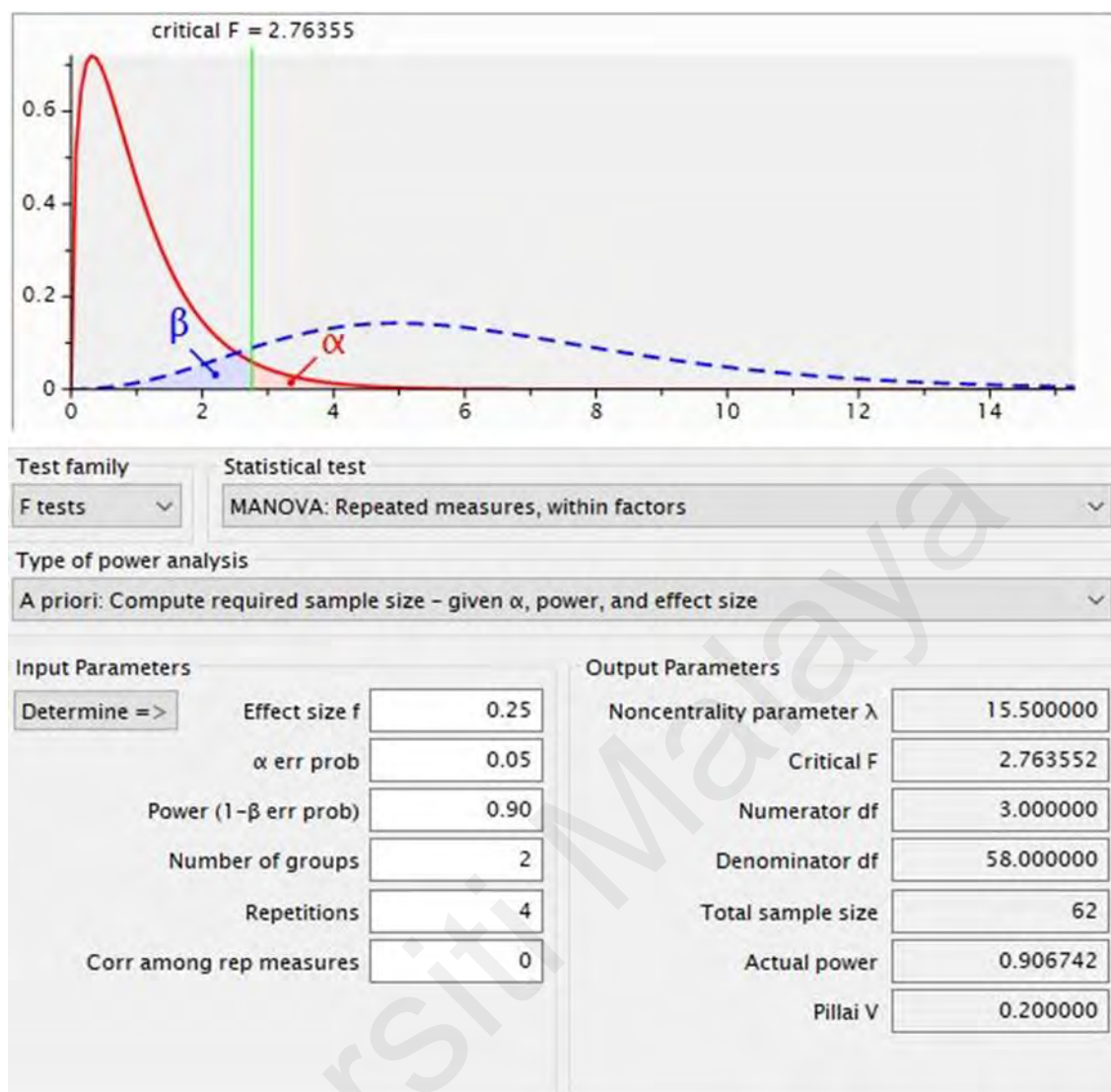


Figure 3.2: Power Analysis

The participants at this stage of their language learning were selected for this study. These participants were both male (33%) and female (67%). They were all adult EFL learners (between 18 and 32). They had about two years of experience in language learning. All these participants spoke Persian (Farsi) as the first language. The participants were all Muslim and of Iranian ethnicity.

In addition, the researcher selected 10 respondents from the experimental group (randomly) to collect qualitative data for this study. The reason for selecting the respondents from the experimental group is that they only experienced MALL, and the control group learner did not have this experience. Thus, the control group learners could

not be held accountable for answering the interview questions. These respondents went through an interview session; however, as data saturation was not achieved by interviewing 10 respondents, the researcher interviewed more respondents. Finally, data saturation was observed as qualitative data were collected from 17 participants in the experimental group. These respondents were both male (6) and female (11). They were all adult language learners aged between 19 and 31.

3.4.3 Teacher Participants

To conduct the study, 5 teachers participated in the study. The teachers were selected among the experienced teachers in the institute who were allowed by the language institute management to teach upper-intermediate and advanced classes. All teacher participants held masters' degrees in language teaching and had between 6 and 18 years of experience in language teaching. Two teachers were involved in teaching the control group, and 3 teachers were involved in teaching the experimental group learners. All teachers' had a briefing session. The experimental group teachers (n=3) had 2 more sessions of briefing through which they were familiarized with the PBL approach, its objectives, and how it should be implemented in the online classes. The materials (ill-structured problems) were presented to the teachers in these sessions, and conducting PBL classes by forming an online group on Telegram with the teachers was demonstrated to them.

3.4.4 Rater Participants

Three experienced raters were asked to score the pretest and the posttests speaking audio files in this study. Table 3.1 shows the demographics of the raters.

Table 3.1: Demographics of the raters

N	Code	Age	Gender	Education	Assessment Experience	Teaching Experience
1	M.S.	41	Female	M.A. in English (1999)	14	17
2	A.G	39	Male	M.A. in English (2003)	6	11
3	P.A	43	Female	M.A. in English (2000)	14	16

In order to make sure the raters had an identical understanding of the scoring rubrics given to them, they were given sample audio files and were asked to score the files based on the rubrics. In case inconsistencies were found among the raters, they were asked to explain and justify their decisions. This process continued until, statistically, it was found that the difference between the raters' score are negligible.

3.5 Instrumentation

A number of instruments (tests) were used in this study. These instruments are explained in this section.

3.5.1 Oxford Placement Test (OPT)

Oxford Placement Test Version 1.1 was administered as homogeneity test. OPT was administered to make sure the participants are at the same level of language proficiency prior to conducting the main study. The test has 60 questions. It was scored analytically by considering 1 point for each right answer and zero point for each wrong answer. The OPT test mainly includes vocabulary and grammar questions that are asked in a communicative manner.

3.5.2 IELTS Speaking Test (Pretest and Posttest)

An IELTS speaking test was administered to the participants once after the homogeneity test, and once as posttest (Appendix C). The topic of the test was "discussing a beautiful place" the participants had visited. The test only included Task 2 and 3 of the speaking test. Task 1 of the test includes personal information, which was not in line with the objectives of the study. The test lasted about 10 minutes for each participant.

3.5.3 Semi-Structured Interview

A semi-structured interview was conducted once in the middle, and once after the treatment. The interview included 14 questions (see appendix D), and was conducted only with the experimental group participants. The questions centered on the mobile-assisted PBL and since the control group learners had not experienced mobile-assisted PBL, it was only administered to the experimental group learner. It should also be mentioned that the objective of conducting the interview was not to compare the answers of the control group with the experimental group. Rather, the researcher aimed at understanding the views of the participants who had experienced mobile-assisted PBL.

3.5.4. Scoring Speaking Proficiency

A significant aspect of this study is the way speaking proficiency was scored. Three raters scored the IELTS speaking test results. The researcher had to make sure that the raters score the speaking files identically. Also, as IELTS speaking was used in this study as pretest and posttest, the researcher made use of the public version of IELTS speaking rubrics for scoring. This scoring scheme has main rubrics, i.e., fluency, lexical resource, grammatical accuracy, and pronunciation (Appendix M). The researcher also benefited from task achievement in the CEFR model and introduced it as the 5th variable in the scoring procedure. One of the main objectives of PBL is to find out whether or not the

learning problem is solved. A suitable approach to understand this issue is to see whether or not the task objective is fulfilled. Therefore, the researcher added task achievement to the scoring procedure.

These components are speaking proficiency cannot be scored analytically, as they are described in the scoring scheme, and an analytical scoring scheme is not introduced. Thus, the researcher asked the raters to score the speaking files holistically. There were three sessions of practice until the raters managed to score the speaking files in the same manner. Later inter-rater reliability was measured to make sure their scoring procedure does not differ statistically.

3.6 Pilot Study

This study was piloted with 6 participants for 3 sessions. Each session lasted for 75 minutes, and only the experimental group procedure was implemented. The main reason for conducting the pilot study was to make sure the procedure of the study is feasible and to find out if any changes were required before conducting the main study. Through the pilot study, the researcher realized that the focus should not be given to competition between the groups. The feedback should be constructive to impede negative feelings about the study. In mobile-assisted PBL, the students should give feedback on other groups' performance. Where the students do not agree, the teacher should intervene and give final feedback.

3.7 Procedure

Consent forms (Appendix A) were given to the participants in the participants' native language at the beginning of the study to comply with the rules of ethical research. Next, the Oxford Placement test version 1.1 (Appendix B) was administered as a placement test to 101 language learners who were already studying at an intermediate level in the center.

One reason to use OPT test version 1.1. was that this test was validated by the Research and Development center (R&D) center at Safir institute and was used as an entrance placement test in all branches of Safir. Eighty participants whose scores fell within the range of an intermediate learner in the test were selected for the study. A speaking proficiency test (IELTS speaking Task 2 and 3) was administered to these participants as a homogeneity test and pretest. Based on the results of the pretest, the participants were distributed into two groups, i.e., the control group (N=40) and the mobile-assisted PBL group (experimental group) (n=40) with no statistical difference in their scores in terms of the speaking test (homogeneity).

There were 40 participants in the control group and 40 participants in the experimental group at the beginning of the study. Due to the attrition effect, the study ended with 33 participants in the control group and 37 participants in the experimental group. The excluded participants were those who had not attended one or more of the posttests or were absent for a maximum of 3 sessions. The participants went through the following research schedule:

Table 3.2: Research schedule

Session	activity	Time
1	Consent Form+ Homogeneity Test	About 2 hours
2	Pretest (Oral test)	about 10 min for each participant
3-8	Treatment	About 75 minutes
9	Test	About 10 to 15 min for each participant
10-13	treatment	About 75 minutes
14	First Interview	About 10 to 20 minutes for each respondent
15-19	Treatment	About 75 min
20	Test	About 10 to 20 min for each participant
21-25	treatment	About 75 min
26	Interview	About 10 to 20 min for each respondent
27	Posttest	About 10 to 15 minutes for each participant

The study was started at the beginning of January 2018 and lasted for 4 months and 2 weeks. Two sessions were conducted every week. The classes were held every Saturday and Wednesday afternoon. The study began by administering the homogeneity test and acquiring the participants' consent on the first day of the study. In the next session, an oral proficiency test was administered to the participants. The main treatment lasted for 16 sessions, during which two tests were administered to the participants to check their progress. The last test was administered to the participants at the end of the intervention as a posttest. The interviews were also conducted twice at sessions 14 and 26.

The treatment was implemented in the experimental group, and the control group participants received an equal number of sessions based on their conventional course designed by the institute. Both procedures are explained in detail in the following sections.

3.7.1 The Control Group

Having selected the participants in the control group, they went through the conventional discussion class in the language institute. They went through a total of 16 sessions of 75-minute classes (following the language institutes schedule). All participants in the control group had joined an online discussion class on the Telegram application. The participants were given a discussion topic by the teacher through Telegram one day before the class. The topics selected by the teachers were previously taught to the participants in the previous semesters. Indeed, the main objective of the free-discussion course was to remind the participants of the previously studied materials. They were asked to find relevant information with regard to the topic and be prepared with adequate ideas and vocabulary items to discuss the topic in the following session. The day after, the topic was pinned to the top of the online class on Telegram, and the

participants were asked to begin the discussion while they were present in their class in the institute. This activity was the only mobile-assisted activity in the control group.

In addition, no particular argumentation strategy (e.g., rebuttal, counter argument, etc.) was assigned by the teacher, the participants presented their ideas, and other participants gave feedback on their ideas freely and without a focus on any particular strategy. The focus of the participants was on discussing the topic, while the teacher mostly made corrections concerning grammar and pronunciation. Collaboration in the control group occurred only in this form, and the participants did not form any pairs or groups to delve for ideas.

3.7.2 The Experimental Group

The participants in the experimental group were asked to make sure they have installed Telegram software on their mobile phones. Telegram is the most widely used mobile application in Iran, and most mobile phone users know how to work with this application. By using this software, the participants can type their answers, send a voice message, or send a video of themselves instantly.

Every session of the treatment lasted for 75 minutes. They were asked to only communicate with other students through Telegram, so the whole session was conducted online and through mobile phones. Every participant joined the online class. In addition, every two participants were asked to form an online private group by creating a private chat on Telegram. The reason for selecting 2 participants for each group was that for most conversations, only two learners were required. All participants were given an ill-structured problem at the beginning of each session and were asked to attempt to decode and analyze the topic individually. They were asked to identify what they already knew about the topic and what they needed to find. Next, they could carry out an online search

to find the required information. Having conjectured about how the problem could be solved, they were asked to share their opinions with their group mates in their private groups and attempt to create a plan (conversation plan). In the conversation plan, the verbatim of the dialogue was formed. Each speaker of the dialogue (either A or B) and the sentences to be stated by them were determined. However, the participants were asked to write the initial word of the sentence accompanying one word in the middle if required, and think about the sentences as they spoke for the online class. This was to avoid reading and focus on speaking.

They were supposed to make use of their group mate's ideas to enhance the quality of the conversations. Thus, among all the vocabulary items, grammatical structures, and ideas found by the two groupmates, a selected number of them were used. Having produced the conversation, they were practiced in the group privately and were later presented to the group members in the main class group. All participants gave and received feedback on the conversations. Later the participants had a short discussion through which they were asked to reflect on their learning and the lesson. In the discussion part, the teacher guided the participants to mostly discuss the question with regard to particular aspects that they had taken into account in their conversations.

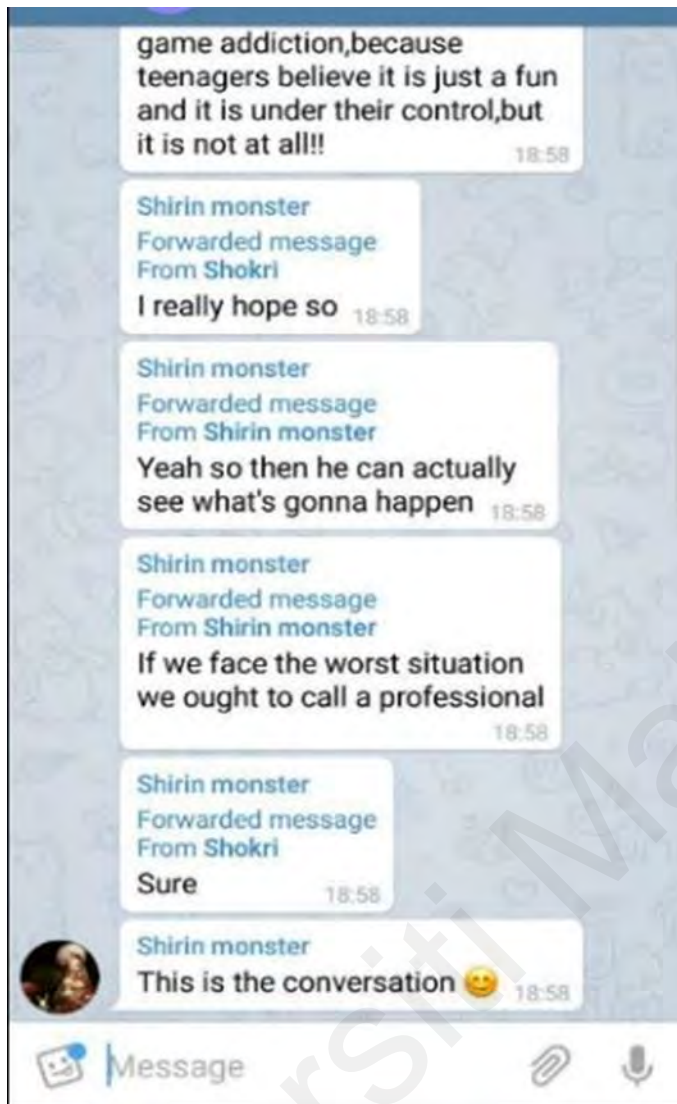


Figure 3.3 Sample text from the experimental group

3.7.3 The Control Group vs. The Experimental Group

Before discussing the differences between the control group and the experimental group, Table 3.3 is presented to list the differences.

TABLE 3.3: Control Group vs. Experimental Group

Groups	
Experimental	Control
37 participants	33 participants
Mobile-Assisted PBL method	Conventional Method
Ill-structured topics for discussion were assigned through Telegram	Well-structured topics for discussion were assigned through Telegram
Participants research for materials	Teacher presented the learning material
Online pair groups were formed and conversations were created (Dialogues)	Groups were formed in the classroom and students discussed the topic. There was no emphasis on dialogues and mostly monologues occurred.
Participants received online feedback after they presented their conversations online.	Feedback was given during the learning process.

The control group and the experimental group in this study differed from some aspects. The main differences can be categorized in terms of the use of MALL, collaboration, ill-structured vs. well-structured topics.

The learning problems (topics) given to the participants in the control group were well-structured (based on the institute's schedule), and the ones given to the experimental group learners were unsystematic and ill-structured. Well-structured topics are systematic, the heart of the problem is made clear to the participants, and they do not need to think critically to understand what the question requires as it is already made clear to them. An

example of a well-structured topic given to the participants in the control group is presented below.

Some people think video games are good for teenagers as they not only keep them busy but also develop their minds. Others think that teenagers should spend more time with their family members rather than their computers. What is your opinion?

As can be seen in the topic, both sides of the argument are made clear to the learner. By reading the question, the learner realizes the main query and knows that he/she should take one side of the argument.

Ill-structured problems presented to the participants in this study differed from the ones used in the control group. Using suggestions from Jonassen (2000) in designing ill-structured problems, the researcher took a number of issues into account. Firstly, as a real-life problem, the learner should be able to see him/herself in the problem. Secondly, the answer to the problem should not be fixed and should vary based on the learners' experiences. Thirdly, a problem-based topic should have an ill-structured design and should not directly lead the learners to the answer. Policy analysis problems, dilemmas, strategic performance problems are among some ill-structured designs for problem-based topics. (Jonassen, 2000). The topic mentioned above used in the control group was used in the experimental group by considering the necessities of an ill-structured problem in the following way:

You have a younger brother or sister who is spending so much time playing video games. As your sibling is very engaged with the online games, you are afraid he/she might be harmed? Create a conversation with the responsible person in this regard, and try to solve the problem.

This type of problem presentation (known as problem scenario) falls in the middle of ill-structuredness vs. well-structuredness continuum based on Jonassen (2000). The learners can produce a variety of conversations with the parents, school teachers, the sibling, etc. to solve the problem. The problem can vary from cyberbullying to health problems; thus, it will be selected based on the analysis of the learner.

The difference in the topics given to the participants leads to the second difference between the control group and the experimental group, i.e., using higher-order reasoning. As the type of problems given to the participants in the control group was well-structured, they do not lead the participants to use their higher-order reasoning, as they do not need to analyze the problem to find the answer. However, as the answer to the ill-structured problems in the experimental group were not fixed, they were required to analyze the topic, determine the interlocutor for their conversations, determine the main problem, and find relevant linguistic items (vocabulary, grammar) to discuss the solutions.

Another difference between the groups is with regard to collaborations. The control group participants in the study collaborated with their classmates both online and in the class; however, the experimental group participants were involved in more forms of collaboration. They were supposed to form two-by-two online groups on Telegram in the form of private chats (not visible to other class members) and discuss their findings before presenting them to the peers in the online class. Later they were also involved in a feedback session with their classmates in the online class.

3.8 Validity

One of the significant issues to determine any study is the validity of constructs and content. Firstly, the PBL tutorship model used in this study was validated by designing it based on two main models in PBL tutorship by Hmelo-Silver (2004) and Hung (2006).

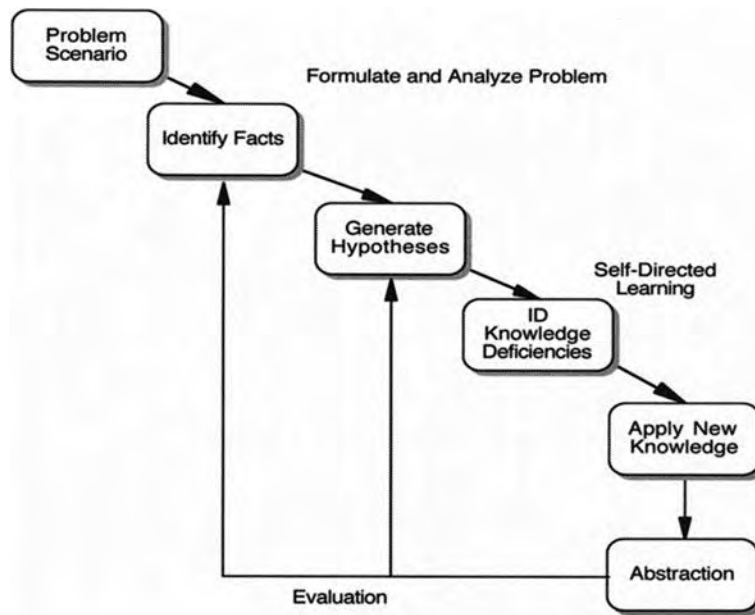


Figure 3.4: Hmelo-Silver's PBL model

The PBL model designed by Hmelo-Silver is based on higher-order reasoning. It begins by a presentation of a problem scenario and directs the learners in a self-directed learning (SDL) process in which they are required to identify facts, generate a hypothesis, identify knowledge deficiencies and apply new knowledge to solve problems. This model is a very valid model in the field of education and has been used in over 3500 studies. As a valid model, Hmelo-silver's PBL tutorship model was used as the backbone in designing the PBL model used in this study. However, the researcher believed that the steps mentioned in the model should be expanded so that the language tutors know what to expect from the learners, and the learners' duties on their path to higher-order reasoning are made clearer. Therefore, this model was merged with the one designed by Hung's (2006) 3C3R model.

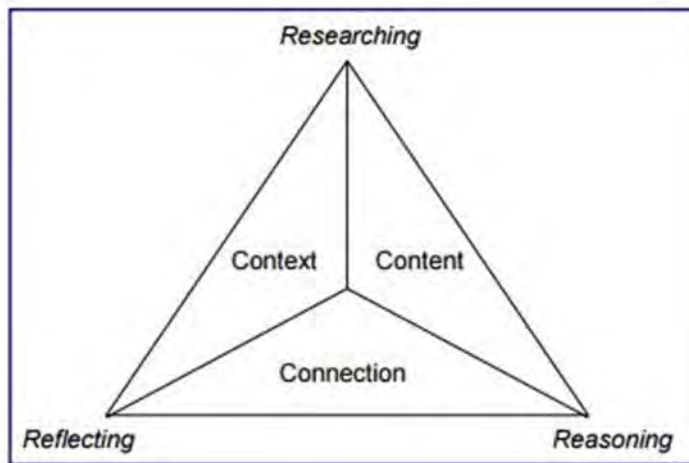


Figure 3.5: Hung's 3C3R model

The model identifies 6 elements of problem-based learning, i.e., researching, reflecting, reasoning, context, content, and connection. This characteristic, if implemented correctly, can facilitate higher-order reasoning; thus, were implemented in the PBL model used in this study.

3.8.1 Validity of the Semi-Structured Interview

The semi-structured interview questions (appendix D) used in this study were validated before being used in this study. Fourteen questions were directly extracted based on the 9 steps of the PBL Model used in the study. Also, the questions were given to 5 experts in the field, and they were asked to score the questions based on their relevance, consistency, representativeness, the wording of the questions (Appendix G). The experts were also asked to assert their comments about the questions. After the questions were rated by 5 experts in the field, Kappa was calculated for the questions. As the Kappa ratio ranged between .75 and .100, it was assumed that there was enough consistency between the answers provided by the raters, and the interview questions could be further in the study.

3.9 Reliability

Another significant issue to determine with regard to the collected data is reliability. Different techniques were used to make sure about the quantitative and qualitative data in this study were reliable.

3.9.1 Reliability of the Quantitative Data

One of the issues which can significantly affect the reliability of raters' scores in terms of scoring speaking proficiency is considering different feature of discourse in the scoring process (Shohamy, 1994); therefore, it is suggested that the raters should be well aware of what rubrics they should take into account in the scoring process and how these rubrics should be scored. Defining these constructs is a challenge for the researchers and the raters. However, there are techniques to tackle the difficulty of this problem. As a result, one of the main aims of the researcher in this study in the process of scoring the speaking proficiency of the participants was to define a unique set of constructs. Brown, Iwashita, and McNamara (2005) suggested that the insights received from the analysis of speaking tests can help define these constructs. Therefore, two moderation processes were assigned in this study, i.e., the external moderation and the internal moderation, expecting that the raters could be informed of the scoring rubrics and how to score them.

Three raters were asked to score the participants speaking tests (pretests and posttests) in the control group and the experimental group. Although these raters had years of experience in teaching and scoring the speaking skill, they were asked to pass 3 briefing sessions. In the first session, they were presented with the scoring scheme intended for this study, and it was explained to them. Providing the raters with one scoring scheme can have a significant impact on the reliability of the scores as they adopt similar rubrics to score the tests. This process is known as 'external moderation.'

Having presented the raters with the scoring scheme, they were given 3 sample audio of a students' speaking test and were asked to score the students' speaking proficiency using the scoring scheme. All five components of the test, i.e., pronunciation, grammatical structures, vocabulary, fluency, and task achievement, were scored. As the scoring scheme is not an analytical scoring scheme, the scores could be affected by the raters' interpretation of the scheme. Thus, in the first attempt, the desired inter-rater reliability was not achieved. However, the researchers' assistant highlighted the main differences in the scores and asked the raters to discuss and justify why they had scored the speaking test differently. Based on the justifications and after scoring 3 audio files, the raters came up with one final understanding of the scoring scheme. They were given a new audio speaking test and were asked to repeat the process. This process was repeated 3 times until the desired inter-rater reliability was achieved. This process is known as 'internal moderation.'

During the scoring process, the raters were not informed whether the audio files given to them were of the experimental group or the control group to avoid the 'rater expectancy' effect. Finally, after all, audio files were scored, inter-rater reliability was checked through the interclass coefficient on Statistical Package in Social Sciences (SPSS). As all scores were found to have inter-rater reliability, they were further used in the data analysis process. As for the OPT test, which was not scored by the raters, the KR-21 formula on SPSS was used to check the reliability. Considering that $\alpha = .84$, this set of scores was also found reliable.

3.9.2 Reliability of the Qualitative Data

Based on the nature of the qualitative data, different techniques were used to check the reliability of the scores. As qualitative data analysis is subjective and coding of data is not systematic, it is many times accused of not being reliable unless relevant techniques are used to ensure the reliability of data. Given (2008) argues that the transparency of data analysis and coding procedure is necessary to ensure the reliability of qualitative data; as a result, the coding scheme and procedure is explained clearly in the next section. In addition, the researcher administered the semi-structured interviews twice in this study to make sure the respondents' answers were consistent. Where differences in the answers given by the respondents were observed, the researcher contacted the respondents and asked he/she to clarify what he/she meant. After all, transcription was prepared, and coding was conducted, the results were sent to the participants, and they were asked to approve what they had said so that the results could be used (member checking). These techniques have been mentioned by Given (2008) as necessary steps to ensure the reliability of qualitative data.

3.10 Qualitative Content Analysis (QCA)

The main approach to analyze the qualitative data in this study was qualitative content analysis. QCA provides a systematic analysis of qualitative data and suits the nature of qualitative data. Babbie (2007) notes that QCA is suitable for qualitative data analysis in various fields in social sciences. McNabb (2005) also notes that QCA does not disturb the respondents and is a convenient approach to qualitative data analysis.

The model for qualitative analysis used in this study was that of Hsieh and Shannon (2005) who consider 8 stages in QCA, i.e., 1) preparation of data, 2) defining the units or themes of analysis, 3) developing categories and coding scheme, 4) pre-testing the coding

scheme on the sample, 5) coding all the text, 6) assessing the consistency of coding employed 7) drawing inferences based on coding or themes, and 8) presentation of results. Due to the practicality of QCA, as explained by Hsieh and Shannon (2005), it has been used in many studies in social sciences in various fields, such as discourse, law, education, etc.

The steps mentioned above were implemented one by one in this study for QCA. Firstly, the researcher collected the data from 17 respondents through semi-structured interviews and transcribed them (preparation of data). While transcribing the audio files, the researchers' focus was on what is said rather than how it is said. So, the researcher made use of intelligent verbatim transcription without jotting down expressions such as laughter and pauses.

Next, the main themes were extracted from the respondents' feedback (defining the units or themes of analysis). In this step, the main themes extracted were not chosen based on predetermined categories. Instead, the focus was on the themes that emerged from the respondents' speech. Later and based on the extracted themes, the main categories were extracted from the respondents' feedback (developing categories and coding scheme). The researcher monitored the data, and, in case of necessity, the respondents were contacted for clarification. Also, irrelevant themes were extracted from the analysis (pre-testing the coding scheme on the sample). The irrelevant themes included the themes which were not relevant to PBL and could not help find the answer to the research question. Having made sure that this process is suitable for data analysis, it was used to code the whole transcriptions based on the main extracted codes (coding all the text). The researcher conducted member-checking to make sure the respondents had given consistent replies. In addition, the consistency of all collected codes was checked against each other (assessing the consistency of coding employed). The conclusion was made based on the

codes that remained after excluding the irrelevant ones (drawing inferences on the basis of coding or themes), and finally, the results were presented in this thesis (presentation of results).

3.11 Summary of the Chapter

The research method used in this study was explained in detail in this chapter. Pragmatism was introduced as the main philosophical assumption in this study. After explaining the demographic data of the participants and their selection procedure, the main procedure of the study was explained by giving a detailed account of the activities in the control group and the experimental group. The researcher also discussed the differences between the control group and the experimental group.

As without gauging the reliability and validity of the instruments, models, and analysis procedures used in the study, the results of the study cannot be accepted. The researcher explained the validity of the PBL models used in this study, the validity of the semi-structured interview question, and the reliability of both quantitative and qualitative data. Finally, qualitative content analysis was explained as the main procedure to extract the themes from the respondents' feedback.

CHAPTER 4: DATA ANALYSIS

4.1 Introduction

The fourth chapter entailed 2 main sections. In the first section, quantitative analysis of data is explained. Statistical Package in Social Sciences (SPSS) (version 21) was used to analyze the quantitative data. Multivariate ANOVA (MANOVA) was used as the main statistical tool to analyze the quantitative data. In the second section of the study, QCA was used analyze the qualitative data.

4.2. Results

The present study is an attempt to explore the effect of mobile-assisted PBL on the spoken proficiency of Iranian EFL learners. It also investigates which of aspects of speaking proficiency; i.e. accuracy of grammatical structures, pronunciation, vocabulary, fluency, and task achievement was affected by mobile-assisted PBL. The following research questions and their respective null-hypotheses were formulated to address the above mentioned goals.

4.3 Research Questions and Null-Hypotheses

- Q1. How does Mobile-Assisted PBL affect speaking proficiency of Iranian EFL learners?
- Q2. Which aspect of speaking proficiency of Iranian EFL learners, i.e., grammatical structures, pronunciation, vocabulary, fluency, and task achievement is affected by mobile-assisted PBL?
- Q3: What are the views of Iranian EFL learners regarding mobile-assisted PBL?

The following null-hypotheses are investigated in this report;

- H01. Mobile-Assisted PBL does not significantly affect speaking proficiency of Iranian EFL learners.

H02. Aspects of spoken proficiency, i.e., grammatical structure, pronunciation, vocabulary, fluency, and task achievement of Iranian EFL learners' do not significantly improve as a result of mobile-assisted PBL.

4.3.1 Subject Selection Phase of the Study

The OPT test version 1.1 was administered to 101 students in order to selected subjects to participate in the main study. They were selected based on the mean of 31.77 plus and minus one standard deviation of 8.18. The KR-21 index used to gauge reliability for the OPT test was .84. Table 4.1 shows the descriptive statistics.

Table 4.1: Descriptive statistics; Oxford placement test (subject selection phase of study)

	N	Min	Max	Mean	Std. Deviation	Variance
OPT	101	16	55	31.77	8.185	66.998
KR-21	.84					

4.3.2 Testing Normality Assumption

Since the data collected through this study were analyzed using parametric statistical analyses of independent t-test and multivariate ANOVA (MANOVA), the normality of the data should be probed. The absolute values of the ratios of skewness and kurtosis over their standard errors were lower than 1.96 (Appendix I); hence It can be concluded that the distribution of the scores on OPT test was normal.

4.3.3 Homogenizing Groups on Oxford Placement Test

An independent t-test was used to compare the experimental and control groups' means on the Oxford Placement Test (OPT) in order to prove that they enjoyed the same level of general language proficiency prior to the main study. Based on the results displayed in Table 4.2 it can be claimed that the experimental (M = 30.73, SD = 4.97) and control (M = 31.85, SD = 4.57) groups had almost the same means on the OPT.

Table 4.2: Descriptive statistics; Oxford placement test by groups

	Group	N	Mean	Std. Deviation	Std. Error Mean
OPT	Experimental	37	30.73	4.970	.817
	Control	33	31.85	4.570	.795

The results of the independent t-test ($t(68) = .976, p = .332, 95\% \text{ CI} [-1.16, 3.40], r = .118$ representing a weak effect size) (Table 4.3) indicated that there was not any significant difference between the two groups' mean scores on the OPT. Thus it can be claimed that they enjoyed the same level of general language proficiency prior to the main study.

Table 4.3: Independent samples t-test; Oxford placement test by groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	df	Sig. (2-tailed)	MD	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variance assumed	.172	.680	.976	68	.332	1.11	1.14	-1.16	3.40

The negative 95% lower bound confidence interval of -1.16 indicated that the difference between the two groups' means on the OPT could have been zero. Thus the above mentioned conclusion as no significant difference between the two groups' means was correctly made. It should also be noted that the assumption of homogeneity of variances was met (Levene's $F = .172, p = .680$). That is why the first row of Table 4.3, i.e. "Equal variances assumed" was reported.

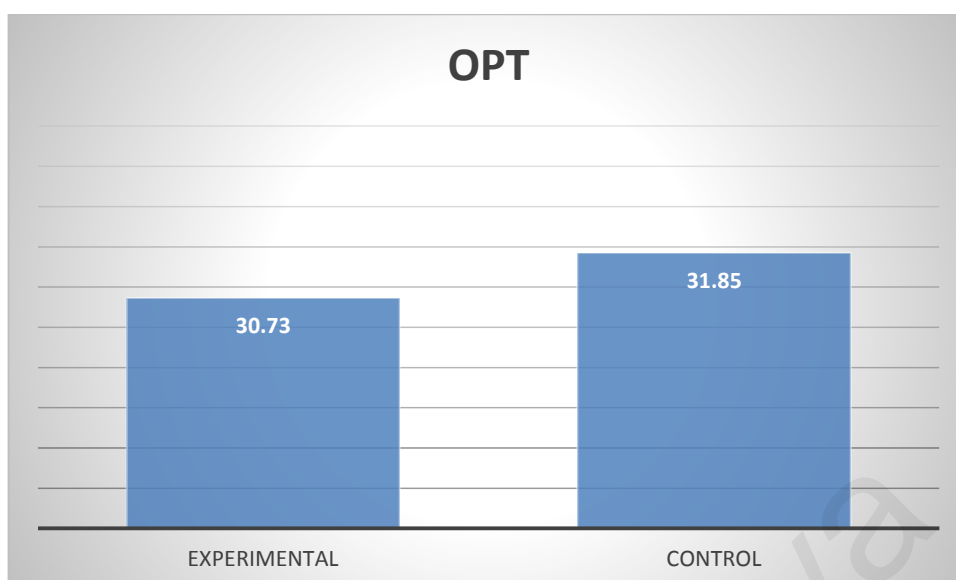


Figure 4.1: Mean on Oxford placement test by groups

4.3.4 Homogenizing Groups on Pretest of Speaking

A multivariate ANOVA (MANOVA) was run to compare the experimental and control groups on the five components of speaking; i.e. grammatical structures, pronunciation, vocabulary, fluency, and task achievement in order to prove that the two groups were homogeneous in terms of their speaking ability prior to the administration of the treatments. Before discussing the results, it should be mentioned that MANOVA has two specific assumptions; i.e. homogeneity of covariance matrices and homogeneity of variances. That is to say; MANOVA requires that the correlations between any two dependent variables (components of speaking) be roughly the same across the two groups. Box's test was run to probe the assumption of homogeneity of covariance matrices that showed non-significant results (Box' M = 13.69, p = .633). Thus, the assumption of homogeneity of covariance matrices was met (Appendix J).

MANOVA also requires that the groups' variances be roughly the same. Based on the results, it can be claimed that the assumption of homogeneity of variances was met on pretests of; grammatical structures ($F(1, 68) = .028, p = .868$), pronunciation ($F(1, 68) = .455, p = .502$), vocabulary ($F(1, 68) = .313, p = .578$), fluency ($F(1, 68) = .295, p = .589$) and task achievement ($F(1, 68) = .109, p = .743$) (Appendix J).

Table 4.4 displays the results of the MANOVA. Based on these results ($F(5, 64) = .274, p = .926$, Partial $\eta^2 = .021$ representing a weak effect size) it can be concluded that there were not any significant differences between the experimental and control groups' means on the five components of pretest of speaking. Thus, it can be concluded that the two groups were homogenous in terms of their speaking ability prior to the main study.

Table 4.4: Multivariate tests; components of pretest of speaking by groups

Effect		Value	F	Hypothesis df	Sig.
Intercept	Pillai's Trace	.986	919.442	5	.000
	Wilks' Lambda	.014	919.442	5	.000
	Hotelling's Trace	71.831	919.442	5	.000
	Roy's Largest Root	71.831	919.442	5	.000
Group	Pillai's Trace	.021	.274	5	.926
	Wilks' Lambda	.979	.274	5	.926
	Hotelling's Trace	.021	.274	5	.926
	Roy's Largest Root	.021	.274	5	.926

Based on the results displayed in Table 4.5 and Table 4.6 it can be claimed that;

- a) There was not any significant difference between the experimental ($M = 18.94$) and control ($M = 18.74$) groups' means on the pretest of grammatical structures ($F(1, 68) = .118, p = .732$, Partial $\eta^2 = .002$ representing a weak effect size).

- b) There was not any significant difference between the experimental (M = 18.75) and control (M = 18.54) groups' means on the pretest of pronunciation (F (1, 68) = .122, p = .728, Partial η^2 = .002 representing a weak effect size).
- c) There was not any significant difference between the experimental (M = 18.27) and control (M = 18.45) groups' means on the pretest of vocabulary (F (1, 68) = .068, p = .795, Partial η^2 = .001 representing a weak effect size).

Table 4.5: Tests of between-subjects effects; components of pretest of speaking by groups

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Group	Pre-Gram	.818	1	.818	.118	.732	.002
	Pre-Pro	.779	1	.779	.122	.728	.002
	Pre-Vocab	.536	1	.536	.068	.795	.001
	Pre-Fluency	.155	1	.155	.025	.874	.000
	Pre-Task	.915	1	.915	.105	.747	.002
Error	Pre-Gram	469.959	68	6.911			
	Pre-Pro	432.993	68	6.368			
	Pre-Vocab	537.185	68	7.900			
	Pre-Fluency	414.933	68	6.102			
	Pre-Task	593.182	68	8.723			
Total	Pre-Gram	25374.778	70				
	Pre-Pro	24800.000	70				
	Pre-Vocab	24138.889	70				
	Pre-Fluency	20815.444	70				
	Pre-Task	16174.556	70				

- d) There was not any significant difference between the experimental (M = 17.02) and control (M = 17.12) groups' means on the pretest of fluency (F (1, 68) = .025, p = .874, Partial η^2 = .000 representing a weak effect size).
- e) There was not any significant difference between the experimental (M = 15.02) and control (M = 14.79) groups' means on the pretest of task achievement (F (1, 68) = .105, p = .747, Partial η^2 = .002 representing a weak effect size).

Table 4.6: Descriptive statistics; components of pretest of speaking by groups

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Pre-Gram	Experimental	18.964	.432	18.102	19.826
	Control	18.747	.458	17.834	19.661
Pre-Pro	Experimental	18.757	.415	17.929	19.585
	Control	18.545	.439	17.669	19.422
Pre-Vocab	Experimental	18.279	.462	17.357	19.201
	Control	18.455	.489	17.478	19.431
Pre-Fluency	Experimental	17.027	.406	16.217	17.837
	Control	17.121	.430	16.263	17.979
Pre-Task	Experimental	15.027	.486	14.058	15.996
	Control	14.798	.514	13.772	15.824

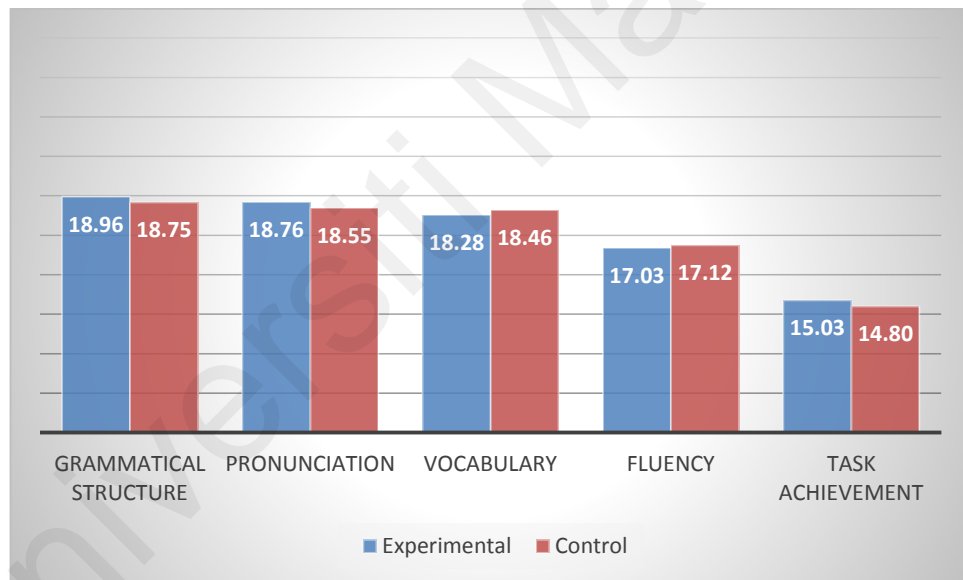


Figure 4.2: Means on components of speaking by groups

4.4 Inter-Rater Reliability of the Scores

4.4.1 Pretests of Speaking

Table 4.7 displays the inter-rater reliability for the three raters who rated the performance of the participants on the pretests of speaking. The results indicated that there were significant agreements between the three raters on pretests of; grammatical structure ($\alpha = .980, p < .001$), pronunciation ($\alpha = .980, p < .001$), vocabulary ($\alpha = .985$

$p < .001$), fluency ($a = .984$, $p < .001$) and task achievement ($a = .986$, $p < .001$). It should be noted that the SPSS software produces the intra-rater reliability indices (Single Measures) which are not concerned in this study.

Table 4.7: Intra-class correlation coefficient; pretests of speaking

Pretests	Measures	Intra-class Correlation	95% Confidence Interval		F Test with True Value			
			Lower Bound	Upper Bound	Value	df1	df2	Sig
Grammar	Single	.942	.916	.962	49.90	69	138	.000
	Average	.980	.970	.987	49.90	69	138	.000
Pronunciation	Single	.943	.917	.962	50.74	69	138	.000
	Average	.980	.971	.987	50.74	69	138	.000
Vocabulary	Single	.956	.935	.971	66.06	69	138	.000
	Average	.985	.977	.990	66.06	69	138	.000
Fluency	Single	.953	.931	.969	62.15	69	138	.000
	Average	.984	.976	.989	62.15	69	138	.000
Task A.	Single	.958	.939	.972	69.84	69	138	.000
	Average	.986	.979	.991	69.84	69	138	.000

4.4.2 First Posttests of Speaking

Table 4.8 displays the inter-rater reliability for the three raters who rated the performance of the participants on the first posttests of speaking. The results indicated that there were significant agreements between the three raters on first posttests of; grammatical structure ($a = .986$, $p < .001$), pronunciation ($a = .987$, $p < .001$), vocabulary ($a = .988$, $p < .001$), fluency ($a = .992$, $p < .001$) and task achievement ($a = .995$, $p < .001$).

Table 4.8: Intra-class correlation coefficient; first posttests of speaking

Pretests	Measure s	Intra class Corr elati on	95% Confidence Interval		F Test with True Value			
			Lower Bound	Upp er Bou nd	Val ue	df1	df2	Sig
Grammar	Single	.960	.941	.974	73. 26	69	138	.000
	Average	.986	.980	.991	73. 26	69	138	.000
Pronunciati on	Single	.962	.944	.975	77. 28	69	138	.000
	Average	.987	.981	.992	77. 28	69	138	.000
Vocabulary	Single	.966	.949	.977	85. 13	69	138	.000
	Average	.988	.983	.992	85. 13	69	138	.000
Fluency	Single	.977	.966	.985	127 .75	69	138	.000
	Average	.992	.988	.995	127 .75	69	138	.000
Task A	Single	.986	.979	.991	207 .85	69	138	.000
	Average	.995	.993	.997	207 .85	69	138	.000

4.4.3 Second Posttest of Speaking

Table 4.9 displays the inter-rater reliability for the three raters who rated the performance of the participants on the second posttests of speaking. The results indicated that there were significant agreements between the three raters on second posttests of; grammatical structure ($\alpha = .985, p < .001$), pronunciation ($\alpha = .986, p < .001$), vocabulary ($\alpha = .988, p < .001$), fluency ($\alpha = .986, p < .001$) and task achievement ($\alpha = .993, p < .001$).

Table 4.9: Intra-class correlation coefficient; second posttests of speaking

Pretests	Measures	Intra class Correlation	95% Confidence Interval		F Test with True Value			
			Lower Bound	Upper Bound	Value	df1	df 2	Sig
Grammar	Single	.957	.937	.972	68.370	69	138	.000
	Average	.985	.978	.990	68.370	69	138	.000
Pronunciation	Single	.959	.940	.973	71.561	69	138	.000
	Average	.986	.979	.991	71.561	69	138	.000
Vocabulary	Single	.964	.947	.976	81.274	69	138	.000
	Average	.988	.982	.992	81.274	69	138	.000
Fluency	Single	.959	.940	.973	71.528	69	138	.000
	Average	.986	.979	.991	71.528	69	138	.000
Task Achievement	Single	.980	.971	.987	149.044	69	138	.000
	Average	.993	.990	.996	149.044	69	138	.000

4.4.4 Third Posttests of Speaking

Table 4.10 displays the inter-rater reliability for the three raters who rated the performance of the participants on the third posttests of speaking. The results indicated that there were significant agreements between the three raters on third posttests of; grammatical structure ($\alpha = .979, p < .001$), pronunciation ($\alpha = .991, p < .001$), vocabulary ($\alpha = .994, p < .001$), fluency ($\alpha = .988, p < .001$) and task achievement ($\alpha = .988, p < .001$).

Table 4.10: Intra-class correlation coefficient; Third posttests of speaking

Pretests	Measure s	Intra class Corr elati on	95% Confidence Interval		F Test with True Value			
			Low er Bou nd	Upp er Bou nd	Value	df1	df2	Sig
Grammar	Single	.940	.913	.960	48.11	69	138	.000
	Average	.979	.969	.986	48.11	69	138	.000
Pronunciati on	Single	.974	.962	.983	114.18	69	138	.000
	Average	.991	.987	.994	114.18	69	138	.000
Vocabulary	Single	.983	.975	.989	173.88	69	138	.000
	Average	.994	.991	.996	173.88	69	138	.000
Fluency	Single	.965	.948	.977	83.49	69	138	.000
	Average	.988	.982	.992	83.49	69	138	.000
Task A.	Single	.965	.949	.977	84.60	69	138	.000
	Average	.988	.982	.992	84.60	69	138	.000

4.5 Investigating First Null-Hypothesis

The first null-hypothesis stated that the Mobile-Assisted PBL did not significantly affect speaking proficiency of Iranian EFL learners. A repeated measures ANOVA was run to compare the two groups' means on the three posttests. Repeated measures ANOVA assumes that the differences between any two dependent variables should enjoy homogenous variances; i.e. Sphericity assumption. This assumption is probed through the Mauchly's test. After examining the results of the Mauchly's ($W = .631, p < .001$), it was decided to run MANOVA to compare the groups' means on the three posttests because the assumption of Sphericity was violated.

Table 4.11: Mauchly's test of Sphericity; three posttests by groups

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Posttests	.631	30.889	2	.000	.730	.753	.500

A multivariate ANOVA (MANOVA) was run to compare the experimental and control groups on the three posttests in order to probe the first null-hypothesis. Before discussing the results, it should be mentioned that assumptions of homogeneity of covariance matrices and homogeneity of variances were met. The Box's test was run to probe the assumption of homogeneity of covariance matrices. The non-significant results (Box' $M = 2.81$, $p = .848$) indicated that the assumption of homogeneity of covariance matrices was met (Appendix K).

MANOVA also requires that the groups' variances be roughly the same. Based on the results, it can be claimed that the assumption of homogeneity of variances was met on pretests of; first ($F(1, 68) = .455$, $p = .502$), second ($F(1, 68) = .345$, $p = .559$) and third ($F(1, 68) = .097$, $p = .756$) posttests (Appendix K).

Table 4.12 displays the results of the MANOVA. Based on these results ($F(3, 66) = 53.16$, $p < .001$, Partial $\eta^2 = .707$ representing a large effect size) it can be concluded that there were significant differences between the experimental and control groups' means on the three posttests. Thus the first null-hypothesis as "Mobile-Assisted Learning did not significantly affect spoken intelligibility of Iranian EFL learners" rejected.

Table 4.12: Multivariate tests; three posttests by groups

Effect		Value	F	Hypothesis df	Sig.
Intercept	Pillai's Trace	.991	2557.632	3	.000
	Wilks' Lambda	.009	2557.632	3	.000
	Hotelling's Trace	116.256	2557.632	3	.000
	Roy's Largest Root	116.256	2557.632	3	.000
Group	Pillai's Trace	.707	53.164	3	.000
	Wilks' Lambda	.293	53.164	3	.000
	Hotelling's Trace	2.417	53.164	3	.000
	Roy's Largest Root	2.417	53.164	3	.000

Based on the results displayed in Table 4.13 and Table 4.14 it can be claimed that;

- a) There was not any significant difference between the experimental ($M = 18.54$) and control ($M = 17.88$) groups' means on the first posttest ($F(1, 68) = 1.72, p = .194$, Partial $\eta^2 = .0252$ representing a weak effect size).

Table 4.13: Tests of between-subjects effects; three posttests by groups

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Group	Posttest1	7.712	1	7.712	1.723	.194	.025
	Posttest2	34.436	1	34.436	8.041	.006	.106
	Posttest3	79.141	1	79.141	20.272	.000	.230
Error	Posttest1	304.286	68	4.475			
	Posttest2	291.222	68	4.283			
	Posttest3	265.463	68	3.904			
Total	Posttest1	23586.240	70				
	Posttest2	25363.129	70				
	Posttest3	27298.560	70				

- b) The experimental group ($M = 19.57$) significantly outperformed the control group ($M = 18.17$) on the second posttest ($F(1, 68) = 8.04, p = .006$, Partial $\eta^2 = .106$ representing a moderate to large effect size).

- c) The experimental group ($M = 20.62$) significantly outperformed the control group ($M = 18.49$) on the third posttest ($F(1, 68) = 20.27, p < .001, \text{Partial } \eta^2 = .230$ representing a large effect size).

Table 4.14: Descriptive Statistics; Three Posttests by Groups

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Posttest 1	Experimental	18.548	.348	17.854	19.242
	Control	17.883	.368	17.148	18.618
Posttest 2	Experimental	19.575	.340	18.896	20.254
	Control	18.170	.360	17.451	18.889
Posttest 3	Experimental	20.627	.325	19.979	21.275
	Control	18.497	.344	17.811	19.183

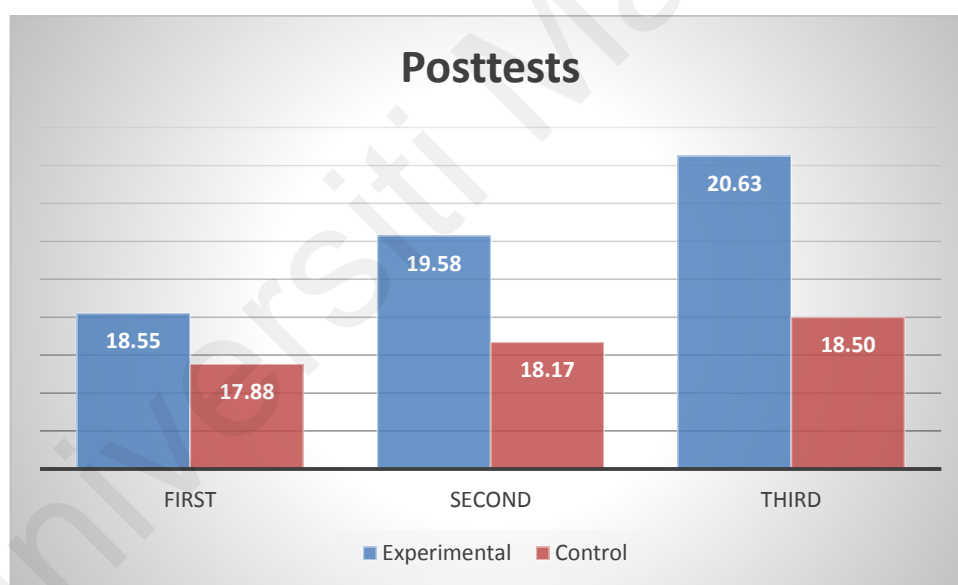


Figure 4.3: Means on three posttests by groups

4.6 Investigating the Second Null-Hypothesis

The second null-hypothesis proposed that the Mobile-Assisted Learning (MAL) did not significantly affect Iranian EFL learners' performance on the components of speaking; i.e. grammatical structures, pronunciation, vocabulary, fluency, and task achievement. Since each of these components were tested three times, three separate

MANOVA were run to compare the experimental and control groups' means on the five components measured at three time intervals.

4.6.1 Comparing Groups on the First Posttests

A multivariate ANOVA (MANOVA) was run to compare the experimental and control groups' means on the first posttests of grammatical structures, pronunciation, vocabulary, fluency, and task achievement. The Box's test was run to probe the assumption of homogeneity of covariance matrices. The non-significant results (Box' M = 15.10, $p = .533$) indicated that the assumption of homogeneity of covariance matrices was met (Appendix L).

It can be claimed that the assumption of homogeneity of variances was met on first posttests of; grammatical structures ($F(1, 68) = 1.15, p = .286$), pronunciation ($F(1, 68) = .155, p = .695$), vocabulary ($F(1, 68) = .565, p = .455$), fluency ($F(1, 68) = .296, p = .588$) and task achievement ($F(1, 68) = .198, p = .658$) (Appendix L).

Table 4.15 displays the results of the MANOVA. Based on these results ($F(5, 64) = .820, p = .540$, Partial $\eta^2 = .060$ representing a moderate effect size) it can be concluded that there were not any significant differences between the experimental and control groups' means on the first posttests of the components of posttest of speaking.

Table 4.15: Multivariate tests; components of first posttests of speaking by groups

Effect		Value	F	Hypothesis df	Sig.
Intercept	Pillai's Trace	.988	1029.977	5	.000
	Wilks' Lambda	.012	1029.977	5	.000
	Hotelling's Trace	80.467	1029.977	5	.000
	Roy's Largest Root	80.467	1029.977	5	.000
Group	Pillai's Trace	.060	.820	5	.540
	Wilks' Lambda	.940	.820	5	.540
	Hotelling's Trace	.064	.820	5	.540
	Roy's Largest Root	.064	.820	5	.540

Based on the results displayed in Table 4.23 and Table 4.16 it can be claimed that;

- a) There was not any significant difference between the experimental (M = 19.87) and control (M = 19.06) groups' means on the first posttest of grammatical structures (F (1, 68) = 1.45, p = .232, Partial η^2 = .021 representing a weak effect size).
- b) There was not any significant difference between the experimental (M = 19.97) and control (M = 19.03) groups' means on the first posttest of pronunciation (F (1, 68) = 2.54, p = .155, Partial η^2 = .036 representing a weak effect size).
- c) There was not any significant difference between the experimental (M = 19.16) and control (M = 18.80) groups' means on the posttest of vocabulary (F (1, 68) = .295, p = .589, Partial η^2 = .004 representing a weak effect size).

Table 4.16: Tests of between-subjects effects; components of first posttests of speaking by groups

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Group	Post1Gram	11.537	1	11.537	1.452	.232	.021
	Post1Pro	15.500	1	15.500	2.549	.115	.036
	Post1Vocab	2.187	1	2.187	.295	.589	.004
	Post1Fluency	8.566	1	8.566	1.382	.244	.020
	Post1Task	4.605	1	4.605	.584	.447	.009
Error	Post1Gram	540.179	68	7.944			
	Post1Pro	413.498	68	6.081			
	Post1Vocab	504.812	68	7.424			
	Post1Fluency	421.543	68	6.199			
	Post1Task	535.815	68	7.880			
Total	Post1Gram	27143.222	70				
	Post1Pro	27124.556	70				
	Post1Vocab	25764.333	70				
	Post1Fluency	22620.778	70				
	Post1Task	17039.111	70				

- d) There was not any significant difference between the experimental (M = 18.13) and control (M = 17.43) groups' means on the first posttest of fluency (F (1, 68) = 1.38, p = .244, Partial η^2 = .020 representing a weak effect size).

- e) There was not any significant difference between the experimental (M = 15.59) and control (M = 15.08) groups' means on the posttest of task achievement (F (1, 68) = .584, p = .447, Partial η^2 = .009 representing a weak effect size).

Table 4.17: Descriptive Statistics; Components of First Posttests of Speaking by Groups

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Post1Gram	Experimental	19.874	.463	18.949	20.798
	Control	19.061	.491	18.082	20.040
Post1Pro	Experimental	19.973	.405	19.164	20.782
	Control	19.030	.429	18.174	19.887
Post1Vocab	Experimental	19.162	.448	18.268	20.056
	Control	18.808	.474	17.862	19.755
Post1Fluency	Experimental	18.135	.409	17.318	18.952
	Control	17.434	.433	16.569	18.299
Post1Task	Experimental	15.595	.461	14.674	16.515
	Control	15.081	.489	14.106	16.056

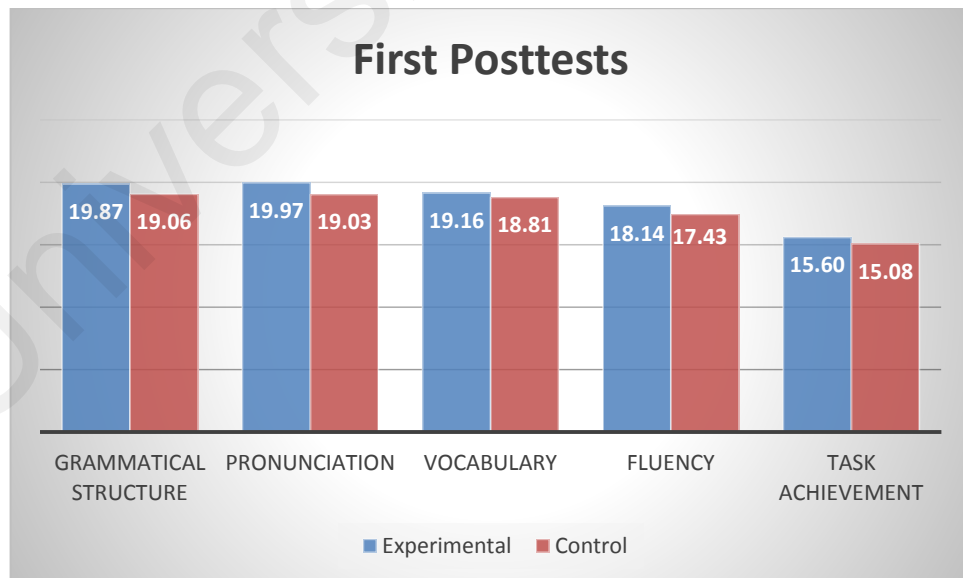


Figure 4.4: Means on first posttests of speaking by groups

4.6.2 Comparing Groups on the Second Posttests

A multivariate ANOVA (MANOVA) was run to compare the experimental and control groups' means on the second posttests of grammatical structures, pronunciation,

vocabulary, fluency, and task achievement. The Box's test was run to probe the assumption of homogeneity of covariance matrices. The non-significant results (Box' M = 28.78, p = .033) indicated that the assumption of homogeneity of covariance matrices was met (Appendix M).

Based on the results, it can be claimed that the assumption of homogeneity of variances was met on second posttests of; grammatical structures (F (1, 68) = .841, p = .362), pronunciation (F (1, 68) = .025, p = .875), vocabulary (F (1, 68) = 1.23, p = .271), fluency (F (1, 68) = .606, p = .439) and task achievement (F (1, 68) = .087, p = .769) (Appendix M).

Table 4.18 displays the results of the MANOVA. Based on these results (F (5, 64) = 3.13, p = .014, Partial η^2 = .194 representing a large effect size) it can be concluded that there were significant differences between the experimental and control groups' means on the second posttests of the components of posttest of speaking.

Table 4.18: Multivariate tests; components of second posttests of speaking by groups

Effect		Value	F	Hypothesis df	Sig.
Intercept	Pillai's Trace	.989	1160.371	5	.000
	Wilks' Lambda	.011	1160.371	5	.000
	Hotelling's Trace	90.654	1160.371	5	.000
	Roy's Largest Root	90.654	1160.371	5	.000
Group	Pillai's Trace	.197	3.138	5	.014
	Wilks' Lambda	.803	3.138	5	.014
	Hotelling's Trace	.245	3.138	5	.014
	Roy's Largest Root	.245	3.138	5	.014

Based on the results displayed in Table 4.19 and Table 4.20 it can be claimed that;

- a) The experimental group ($M = 20.85$) significantly outperformed the control group ($M = 19.31$) on the second posttest of grammatical structures ($F(1, 68) = 5.68, p = .020, \text{Partial } \eta^2 = .077$ representing a moderate effect size).
- b) The experimental group ($M = 21.27$) significantly outperformed the control group ($M = 19.36$) on the second posttest of pronunciation ($F(1, 68) = 10.12, p = .002, \text{Partial } \eta^2 = .130$ representing a large effect size).
- c) The experimental group ($M = 20.45$) significantly outperformed the control group ($M = 19.13$) on the second posttest of vocabulary ($F(1, 68) = 4.20, p = .044, \text{Partial } \eta^2 = .058$ representing a moderate effect size).

Table 4.19: Tests of between-subjects effects; components of second posttests of speaking by groups

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Group	Post2Gram	41.514	1	41.514	5.688	.020	.077
	Post2Pro	63.409	1	63.409	10.121	.002	.130
	Post2Vocab	30.353	1	30.353	4.206	.044	.058
	Post2Fluency	56.183	1	56.183	9.116	.004	.118
	Post2Task	3.726	1	3.726	.482	.490	.007
Error	Post2Gram	496.329	68	7.299			
	Post2Pro	426.045	68	6.265			
	Post2Vocab	490.701	68	7.216			
	Post2Fluency	419.081	68	6.163			
	Post2Task	525.971	68	7.735			
Total	Post2Gram	28899.000	70				
	Post2Pro	29539.111	70				
	Post2Vocab	28043.111	70				
	Post2Fluency	24469.778	70				
	Post2Task	17825.889	70				

- d) The experimental group ($M = 19.36$) significantly outperformed the control group ($M = 17.56$) on the second posttest of fluency ($F(1, 68) = 9.11, p = .004$, Partial $\eta^2 = .118$ representing a moderate to large effect size).
- e) There was not any significant difference between the experimental ($M = 15.93$) and control ($M = 15.47$) groups' means on the posttest of task achievement ($F(1, 68) = .482, p = .490$, Partial $\eta^2 = .007$ representing a weak effect size).

Table 4.20: Descriptive statistics; components of second posttests of speaking by groups

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Post2Gram	Experimental	20.856	.444	19.970	21.742
	Control	19.313	.470	18.375	20.252
Post2Pro	Experimental	21.270	.412	20.449	22.091
	Control	19.364	.436	18.494	20.233
Post2Vocab	Experimental	20.450	.442	19.569	21.332
	Control	19.131	.468	18.198	20.064
Post2Fluency	Experimental	19.360	.408	18.546	20.175
	Control	17.566	.432	16.703	18.428
Post2Task	Experimental	15.937	.457	15.025	16.849
	Control	15.475	.484	14.509	16.441

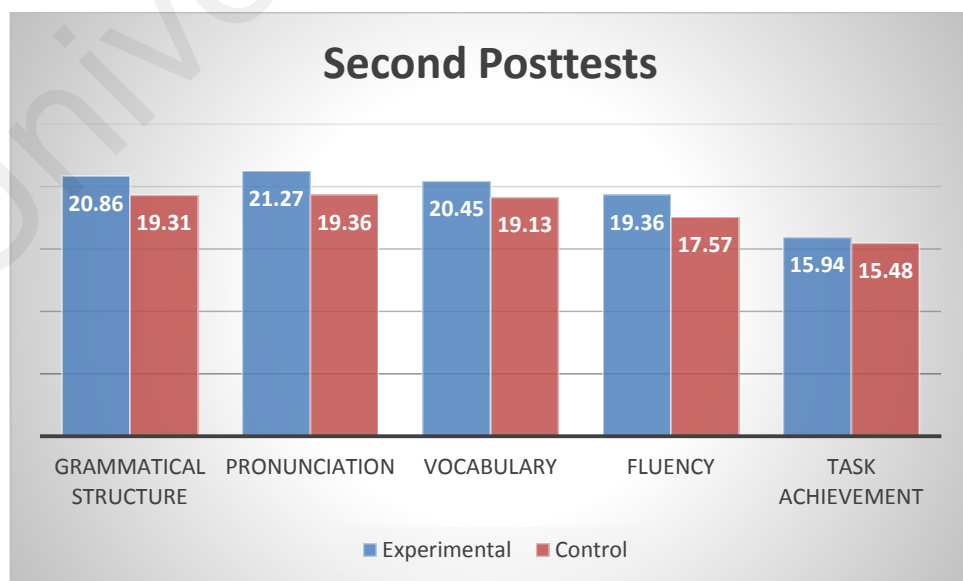


Figure 4.5: Means on second posttests of speaking by groups

4.6.3 Comparing Groups on Third Posttests

A multivariate ANOVA (MANOVA) was run to compare the experimental and control groups' means on the third posttests of grammatical structures, pronunciation, vocabulary, fluency, and task achievement. The Box's test was run to probe the assumption of homogeneity of covariance matrices. The non-significant results (Box' M = 36.06, $p = .004$) indicated that the assumption of homogeneity of covariance matrices was met (Appendix M).

Based on the results, it can be claimed that the assumption of homogeneity of variances was met on third posttests of; grammatical structures ($F(1, 68) = .015, p = .930$), pronunciation ($F(1, 68) = .067, p = .796$), vocabulary ($F(1, 68) = .877, p = .352$), fluency ($F(1, 68) = .024, p = .878$) and task achievement ($F(1, 68) = .066, p = .798$) (Appendix M).

Table 4.21 displays the results of the MANOVA. Based on these results ($F(5, 64) = 7.15, p < .001$, Partial $\eta^2 = .359$ representing a large effect size) it can be concluded that there were significant differences between the experimental and control groups' means on the third posttests of the components of posttest of speaking.

Table 4.21: Multivariate tests; components of third posttests of speaking by groups

Effect		Value	F	Hypothesis df	Sig.
Intercept	Pillai's Trace	.991	1379.712	5	.000
	Wilks' Lambda	.009	1379.712	5	.000
	Hotelling's Trace	107.790	1379.712	5	.000
	Roy's Largest Root	107.790	1379.712	5	.000
Group	Pillai's Trace	.359	7.159	5	.000
	Wilks' Lambda	.641	7.159	5	.000
	Hotelling's Trace	.559	7.159	5	.000
	Roy's Largest Root	.559	7.159	5	.000

Based on the results displayed in Table 4.22 and Table 4.23 it can be claimed that;

- a) The experimental group ($M = 22$) significantly outperformed the control group ($M = 19.36$) on the third posttest of grammatical structures.
- b) The experimental group ($M = 22.67$) significantly outperformed the control group ($M = 19.66$) on the third posttest of pronunciation ($F(1, 68) = 23.48, p < .001$, Partial $\eta^2 = .257$ representing a large effect size).
- c) The experimental group ($M = 21.51$) significantly outperformed the control group ($M = 19.44$) on the third posttest of vocabulary ($F(1, 68) = 11.45, p < .001$, Partial $\eta^2 = .144$ representing a large effect size).

Table 4.22: Tests of between-subjects effects; components of third posttests of speaking by groups

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Group	Post3Gram	97.449	1	97.449	14.803	.000	.179
	Post3Pro	157.930	1	157.930	23.488	.000	.257
	Post3Vocab	74.674	1	74.674	11.452	.001	.144
	Post3Fluency	121.813	1	121.813	18.872	.000	.217
	Post3Task	5.587	1	5.587	.745	.391	.011
Error	Post3Gram	447.636	68	6.583			
	Post3Pro	457.219	68	6.724			
	Post3Vocab	443.391	68	6.520			
	Post3Fluency	438.917	68	6.455			
	Post3Task	509.666	68	7.495			
Total	Post3Gram	31080.000	70				
	Post3Pro	32245.778	70				
	Post3Vocab	30045.000	70				
	Post3Fluency	26596.444	70				
	Post3Task	18767.444	70				

- d) The experimental group ($M = 20.53$) significantly outperformed the control group ($M = 17.88$) on the third posttest of fluency ($F(1, 68) = 18.87, p < .001$, Partial $\eta^2 = .217$ representing a large effect size).
- e) There was not any significant difference between the experimental ($M = 16.41$) and control ($M = 15.84$) groups' means on the posttest of task achievement ($F(1, 68) = .745, p = .391$, Partial $\eta^2 = .011$ representing a weak effect size).

Table 4.23: Descriptive statistics; components of third posttests of speaking by groups

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Post3Gram	Experimental	22.000	.422	21.158	22.842
	Control	19.636	.447	18.745	20.528
Post3Pro	Experimental	22.676	.426	21.825	23.526
	Control	19.667	.451	18.766	20.567
Post3Vocab	Experimental	21.514	.420	20.676	22.351
	Control	19.444	.445	18.557	20.331
Post3Fluency	Experimental	20.532	.418	19.698	21.365
	Control	17.889	.442	17.006	18.771
Post3Task	Experimental	16.414	.450	15.516	17.313
	Control	15.848	.477	14.897	16.799

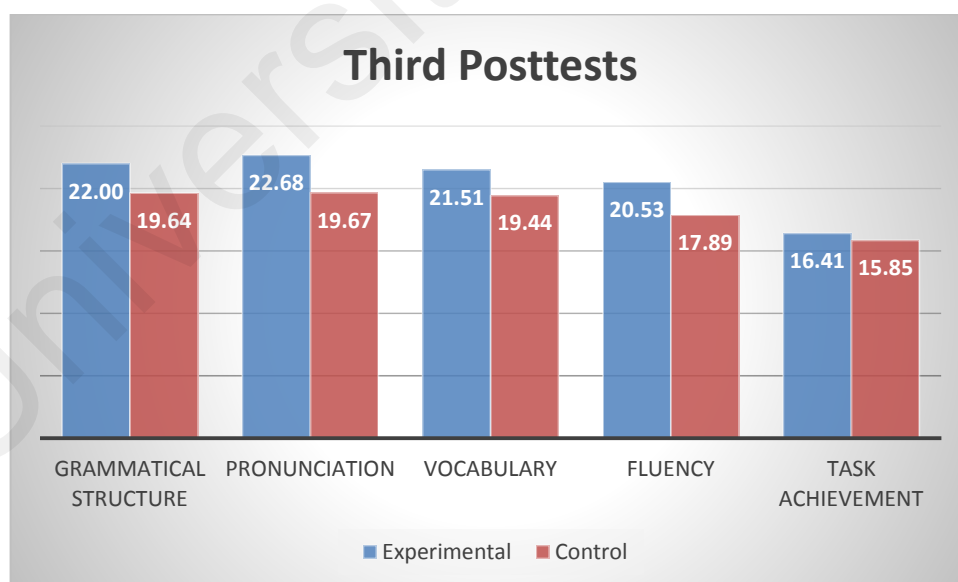


Figure 4.6: Means on Third Posttests of Speaking by Groups

4.7 Summary of the Quantitative Results

The summary of findings is presented in Table 4.24

Table 4.24 Summary of the quantitative results

RQ	Null Hypotheses	Variable	First Test	Second Test	Third Test	Status	Third Test Effect Size
1	H01. Mobile-Assisted PBLL does not significantly affect speaking proficiency of Iranian EFL learners.	Speaking Proficiency in the Second Language	p = .194, Partial $\eta^2 = .0252$	p = .006, Partial $\eta^2 = .106$	p<.001, Partial $\eta^2 = .230$	Rejected	Large
2	H02. Aspects of spoken proficiency, i.e., grammatical structure, pronunciation, vocabulary, fluency, and task achievement of Iranian EFL learners' do not significantly improve as a result of mobile-assisted PBLL.	Fluency	p = .244, Partial $\eta^2 = .020$	p = .004, Partial $\eta^2 = .118$	p<.001, Partial $\eta^2 = .217$	Rejected	Large
		Grammatical Structures	p = .232, Partial $\eta^2 = .021$	p = .020, Partial $\eta^2 = .077$	p<.001, Partial $\eta^2 = .179$	Rejected	Large
		Vocabulary	p = .589, Partial $\eta^2 = .004$	p = .044, Partial $\eta^2 = .058$	p<.001, Partial $\eta^2 = .144$	Rejected	Large
		Pronunciation	p = .155, Partial $\eta^2 = .036$	p = .002, Partial $\eta^2 = .130$	p<.001, Partial $\eta^2 = .257$	Rejected	Large
		Task achievement	p = .447, Partial $\eta^2 = .009$	p = .490, Partial $\eta^2 = .007$	p = .391, Partial $\eta^2 = .011$	Supported	Weak

4.8 Qualitative Data Analysis

In order to explore the respondents' views with regard to mobile-assisted PBL, a semi-structured interview was designed based on the PBL model used in this study and was validated by a panel of 5 experts. The interviews began with 10 respondents in the experimental group. As the point of data saturation was not reached in the first round of interviews, 7 interviewees were added until data was saturated. Data saturation is a concept developed by Strauss and Corbin (1997) who believed that researchers should continue interviewing respondents until the themes in their speech are being repeated. However was only used as a technique to determine the number of respondents and the researcher did not aim at an analysis based on grounded theory. Instead, the interviews were analyzed using Hsieh and Shannon (2005) qualitative content analysis approach as explained in Section 3.9. The following aspects were among the mostly repeated themes in the participants feedbacks.

Table 4.25: The participants' views regarding mobile-assisted PBL

N	Core Theme	F	Type	Sample Quotes
1	Recording conversations	4	Positive	I could check my pronunciations and compare it to others
2	Online search	14	Positive	It affected my overall knowledge. I could check native-like pronunciations. It is easier than checking books....it is faster.
3	Affecting knowledge	7	Positive	While I was searching for the topic I could find new words. I learned random words.
4	Realizing weakness	4	Positive	Learning is communication not knowing grammar. I did not dare talk in English on the phone and online. Now it is easier for me. When I was not sure about the pronunciations, I used the words 'something', 'something like that'... I now understand it was because I know the spelling of the word, but not its pronunciation. Now I use the words and don't pause when I talk.
5	Friendly Atmosphere	5	Positive	The friendly atmosphere motivated me to work with others. Role-plays were fun. My groupmate knows better than me sometimes. She motivated me to talk.
6	Affects listening	3	Positive	We listen but we don't see the speaker, so we pay attention. This helps listening. It is like a real listening tests. In class, we mostly speak than listen.

Continuation of Table 4.25

7	Affects Speaking	9	positive	<p>Almost in all during the session we were busy speaking and practicing.</p> <p>We talked twice. Once in our private group, and once in the online class.</p> <p>I can say I talked more than any other course on Telegram. We had conversation and discussion.</p> <p>I think I can speak faster now. I know pronunciations that I checked online and use them.</p> <p>Someone is recording a voice message, someone is listening. Someone is thinking about it. I was really busy during the class.</p>
8	Chatting on telegram was not effective	2	Negative	<p>We have more control when we talk in the class.</p> <p>It is not real communication I think.</p>
9	Monotonous procedure	3	Negative	<p>The procedure of the class should be changed after some sessions because it is very monotonous.</p> <p>I wish to do something different...For example play a game or listen to a song as well.</p>
10	Need for material	6	Negative	<p>Online search by itself is not enough.</p> <p>I think videos can also help.</p> <p>Sometimes you cannot find your answers in a few minutes, then someone should help.</p> <p>I think Telegram is not suitable because if we had a language learning software with search options we could find the answers faster.</p>
11	Topics were related to the real life	16	positive	<p>Topics were tangible and therefore we won't forget them easily.</p> <p>I was part of the stories. I enjoyed it.</p> <p>I exactly had some of these problems. for example, the conversation about changing my major in high school.</p>
12	Using previous knowledge	7	Positive	<p>I used what I knew and mixed it with what I was learning.</p> <p>This is good to start with what you know. Make a list and then search for new information. I was more aware of my shortcomings.</p>
13	Mobile Search	2	Negative	<p>I think Mobile phone is not a learning tool.</p> <p>I prefer formal classroom.</p> <p>When I was searching, I received many messages from my friends, once I forgot the class and began chatting.</p>

Continuation of Table 4.25

14	Being time consuming	3	Negative	Searching is time-consuming. I prefer to ask the question and get my answer. If I had more time I could find the answers to my questions, but a few minutes in not enough.
15	Collaboration in Learning	6	Positive	The learning task was divided by the number of learners. This reduced the workload. I like thinking in a group. This was really fun. I think this helps us learn a lesson about life.
16	Practical results	11	Positive	We produced the conversations. This was unlike many methods when we only learn and don't produce. I enjoyed it when I designed my conversation which was accepted by other classmates. I still remember that conversation.
17	Role playing	13	Positive	Roleplaying the conversations was the most effective aspect of learning. You feel the conversation instead of reading it. When I role played the conversation for the class, I was not reading it. Because it was on my mobile phone and I was using it. I was using my memory. I felt more confident by role playing the conversation.
18	Self Confidence	8	Positive	Roleplaying the conversations gave me self-confidence. Because you check your conversation with your groupmate, you are more confident about it. I always have problem with pronouncing new words, but I checked them online and with my groupmate. I was sure I was right when I role played the conversation for the class.

As can be understood from Table 4.35, 19 main themes were extracted from the respondents' feedback. These themes can be categorized to those referring to the weaknesses of mobile-assisted PBL and those referring to its strengths. The researcher attempted to probe the answers given by the respondents to have a more in-depth understanding of their views. As mentioned earlier, this study has a confirmatory sequence mixed-method design. Thus, although the quantitative and the qualitative

sections of the study were kept separate during the study, the researcher attempted to support the quantitative results by using qualitative findings. This would help to generalize the findings of the study. One way to do so, was to categorize the respondents' feedback based on the main variables under investigation in this study. As a result, the researcher has a look at the respondents' feedback with regard to fluency, pronunciation, vocabulary learning, task achievement, and accuracy of grammatical structures, along with other main themes that emerged from the respondents' feedback.

4.8.1 Feedback on Mobile-Assisted PBL and Fluency

In general the respondents stated that mobile-assisted PBL can affect fluency in several ways. They assumed that they had more time to practice in this approach; compared to previous class-based semesters or previous online classes they had experienced. They also believed that checking online pronunciations from dictionaries, YouTube, etc. can affect their pronunciation. This, in turn, has effect on their self-confidence as a speaker. As they are confident about their pronunciations, they speak without hesitation. They also believed that mobile-assisted PBL helps them learn more lexical items and this gives them more words to talk.

Example 1:

Respondent 11: *I could check native-like pronunciations.*

Interviewer: *How do you find it?*

Respondent 11: *Very good. I feel more confident, I use the words faster with no doubt. I even stress on the word.*

Example 2:

Respondent 3: *Now I use the words and don't pause when I talk.*

Interviewer: *How do you think it has affected your speaking?*

Respondent 3: *My fluency....for sure....I can talk faster I think.*

Example 3:

Respondent 6: *Almost all during the session we were busy speaking and practicing.*

Interviewer: *Do you think it had effect on any of your skills?*

Respondent 6: *Yes, vocabulary, grammar and fluency. They are related...*

Interviewer: *How are they related?*

Respondent 6: *more vocabulary means more fluency...also better grammar.*

Example 4:

Respondent 5: *We talked twice. Once in our private group, and once in the online class. I can say I talked more than any other course on Telegram. We had conversation and discussion.*

Interviewer: *Okay, Fine... What is affected by it?*

Respondent 5: *On my fluency yes, also vocabulary. One day you talk more and that day you feel better about yourself (laughing)*

4.8.2 Feedback on Mobile-Assisted PBL and Vocabulary

The participants believed that mobile-assisted MALL could also affect their vocabulary knowledge. An aspect mentioned by 7 respondents, in more or less the same manner, was that while they were involved in a search for a targeted vocabulary, they could learn other vocabulary items. The respondents also made reference to the retention of the newly learned vocabulary as they found them relevant to their real life. Replacement of words and phrases such as 'like that', 'something like that', 'something', with words with closer meaning to the context also shows that the learners' vocabulary knowledge had been positively affected by mobile-assisted PBL. In addition some learners believed that their understanding of the words they know was incomplete before,

but PBL approach helps them check native like pronunciation, see examples of usage of the word, and use the word in a meaningful context; as a result, their understanding of the word is more comprehensive. Some examples of the respondents' feedback in presented below:

Example 1:

Respondent 4: *While I was searching for the topic I could find new words.*

Interviewer: *How do you feel about it?*

Respondent 4: *Urrr... it is really effective in my opinion because.. I don't know why but... these words are easier to remember.*

Example 2:

Respondent 8: *I learn random words. For example, I learned this phrase: "places of local interest" when I was looking for "studying abroad".*

Example 3:

Respondent 9: *It helps me with words.*

Interviewer: *How? Can you explain?*

Respondent 9: *I used the words 'something', 'something like that'... I now understand it was because I know the spelling of the word only.*

Interviewer 9: *You mean the problem was ...(pause) urrr..*

Respondent 9: *I didn't know the word completely... I didn't use them. If I can use a word, it means I know the word.*

Example 4:

Respondent 10: *Topics were tangible and ... we won't forget them easily. We use the words very often. I remember, the words I found like 'tourist trap', 'off the beaten track', 'cozy'... (Laughing)...all in one website.. (Laughing again)*

Another aspect which can be understood from the respondents' feedback with regard to vocabulary learning is the relevance of the words to each other and also to their experiences. The respondents tended to remember the vocabulary items which were related to their real-life. This can be understood from the sample interview with respondent 10.

4.8.3 Feedback on Mobile-Assisted PBL and Grammatical Structures

The respondents also noted that mobile-assisted PBL had effects on the knowledge of grammar which may, in turn, have caused the improvement in their accuracy of grammatical structures. The respondents posited that mobile-assisted PBL rectified their views about 'knowing grammar', as after going through PBL tutorship, they consider language learning as communication though they had sufficed to knowing grammar before. Another issue mentioned by the respondents is the practice opportunities given to them through mobile-assisted PBL which had effects on the accuracy of their grammatical structures. Some respondents made reference to different forms of interactions which occurred in the experimental group and assumed that this issue has helped them see the usage of grammar in dialogues, monologues, and discussion in groups.

Example 1

Respondent 2: *I realized that learning is communication not knowing grammar.*

Interviewer: Why? Did you focus on learning grammar in the past?

Respondent 2: No, *I actually don't like language learning by learning grammar, I enjoy songs personally, but at school they tell us grammar is important.*

Example 2

Respondent 13: *Roleplays were fun. You could practice using the sentences...I helps grammar.*

Interviewer: *Can you explain?*

Respondent 13: *Yes, you feel the sentences when you take part in the conversation. The teacher specially told us to change our tone and feel the conversation.*

Example 3

Respondent 15: *At the end of the class in free discussions, you have time to say your sentences, practice grammar, and test your words again.*

4.8.4 Feedback on Mobile-Assisted PBL and Pronunciation

The respondents believed that pronunciation was among the speaking components affected by mobile-assisted PBL in several ways. They stated that through this approach, they could check their pronunciations online and compare the quality of their pronunciations with others (usually groupmates). As a result, they gained more confidence to pronounce the words. They also believed that as they had the chance to reflect on the conversation they had prepared, they could check their pronunciations before they present it to the class. In addition, as they were provided with more opportunities to practice the language (one in the private group and once in the class), they gained more mastery of the words' pronunciation. Below are some samples of the respondents' feedback:

Example 1

Respondent 1: *I could check my pronunciations and compare it to others.*

Interviewer: *How?*

Respondent 1: *Simple, I asked them, "Do you think my pronunciation is correct?"*

Interviewer: *Did you get result?*

Respondent 1: *sometimes, because sometimes they didn't know and then we had to check the net or ask the teacher.*

Interviewer: *could you get your answer?*

Respondent 1: *Usually the teacher did not help much. She said check it online or wait to ask your friends after you do it online for the class members.*

Example 2

Respondent 12: *Before this, when I was dubious about the pronunciations I wouldn't use the words. I checked. Again after sometime, I was confused.*

Interviewer: *how did you solve your problems with hesitations about pronunciation?*

Respondent 12: *I usually rely on my friends. But then I was supposed to have checked it myself. So maybe, ..I can say.. it was mostly on me.*

Example 3

Respondent 14: *I think I can speak faster now*

Interviewer: *Why?*

Respondent 14: *I know pronunciations that I checked online and use them.*

Example 4

Respondent 17: *I always have problem with pronouncing new words, but I checked them online and with my groupmate.*

4.8.5 Feedback on Mobile-Assisted PBLL and Task Achievement

As task achievement is generally defined as 'communicative success', instances of the respondents' feedback which referred to communicative success are reported here. It was mentioned that the respondents' increased ability in pronouncing the words, affected their communication in English, as they could speak with more confidence and more fluently. They also mentioned that mobile-assisted PBLL acquainted them with more forms of communication (indirect rather than face-to-face). This increased their confidence to talk on the phone. Also, the respondents assumed that mobile-assisted PBLL had effect on their listening skill. As listening is an integral part of communication in L2, it can be concluded that this approach has helped the learners to communicate. Below are some samples of the respondents' feedback with regard to task achievement:

Example 1

Respondent 16: *I did not dare talk in English on the phone and online. Now it is easier for me.*

Respondent 7: *We listen but we don't see the speaker, so we pay attention. This helps listening.*

4.8.6 Negative Feedbacks

Not all views about mobile-assisted PBLL were positive. In some occasions, the respondents mentioned the shortcomings of this approach. For example, they stated that communication through mobile phones was not considered as real communication by some respondents and they preferred face-to-face interactions. In addition, it was mentioned that learning through mobile-assisted PBLL is difficult, as the learners do not

have the required control over their learning. Some respondents linked this issue to their inability to find the answer to their questions; therefore, they felt the need for PBL materials accompanying online search. Finally, some respondents felt dubious about using mobile phones as a language learning device and preferred conventional classrooms. Some participants also acknowledged that mobile-assisted PBL is time consuming and they need more time to find all information they need. Some learners also mentioned that they prefer language games or songs to be part of their class. Below are some examples of the respondents' feedback with regard to negative aspects of mobile-assisted PBL:

Example 1

Respondent 7: *We have more control when we talk in the class.*

Interviewer: *Why do you say that?*

Respondent 7: *Because you can ask questions and get your answer.*

Example 2

Respondent 11: *The procedure of the class should be changed after some sessions because it is very monotonous.*

Interviewer: *Why?*

Respondent 11: *Because every session we do the same thing. No games, no songs,...*

Example 3

Respondent 8: *When I was searching, I received many messages from my friends, once I forgot the class and began chatting.*

Example 4

Respondent 9: *If I had more time I could find the answers to my questions, but a few minutes is not enough.*

4.8.7 Other Feedbacks

Other than the aspects explained above, a number of themes were highlighted by the respondents in this research. The respondents stated that online search is a quicker approach to finding answers compared to paperback sources. They also stated that they enjoyed roleplaying the conversations by sending voice and video messages to the main online class on Telegram. They also mentioned that mobile-assisted PBL can help them with the listening skill. They also enjoyed the relevance of the topics given to them to their real life problems. The respondents also mentioned that they had to think about what they already knew and identify their knowledge deficiency. This helped them remember and reflect on their past experiences. They also noted that working collaboratively in PBL groups helps reduce the workload, as you share it with your groupmate and get better results. In addition, in several occasions, the respondents stated that they felt more confident, because they had the chance to check their findings in reliable sources, check the accuracy of their pronunciations and grammatical structures with their groupmates, and finally represent it the whole class and receive a feedback. Finally, the respondents mentioned that designing their own conversations could help them remember the conversation better; compared to receiving a conversation and reproducing it. Some samples of the respondents' feedback is given below:

Example 1

Respondent 13: *It is easier than checking books....it is faster.*

Example 2

Respondent 10: *I was part of the stories. I enjoyed it.*

Example 3

Respondent 17: *I exactly had some of these problems. For example, the conversation about changing my major in high school.*

Example 4

Respondent 1: *I used what I knew and mixed it with what I was learning.*

Example 5

Respondent 6: *Make a list and then search for new information. I was more aware of my shortcomings.*

Example 7

Respondent 12: *The learning task was divided by the number of learners. This reduced the workload.*

Example 8

Respondent 4: *I enjoyed it when I designed my conversation which was accepted by other classmates. I still remember that conversation.*

4.9 Summary of the Chapter

In this chapter, the researcher dealt with both quantitative and qualitative data analysis. In order to answer researcher questions 1 and 2, independent samples t-test and MANOVA were used. The presumptions of using these tools such as reliability, normal distribution, and homogeneity of variance were also checked. In order to answer research question 3, QCA was used. The main themes explored in the respondents' feedback were categorized based on their reference to the main components of speaking proficiency which were under investigation in this study. In addition, other themes such as self-

confidence, relevance to real-life, and also negative views of the participants were thematically categorized and presented in this report.

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CHAPTER 5: DISCUSSION AND CONCLUSION

5.1 Introduction

In this chapter, the findings of the study in light of the previous research are discussed. The quantitative findings are supported by the qualitative findings to present a more comprehensive discussion in this section. However, the quantitative analysis is presented first, and qualitative data is used to confirm the results of the quantitative section. This choice is in line with the mixed method design used in this study, i.e., a confirmatory sequence design. In addition, the conclusion of the study is presented.

This chapter has other subheadings, i.e., limitations of the study, pedagogical implications, theoretical implications, and areas for further research. The limitations of the study, such as the limited number of the participants, access to published material in English rather than the publications in all languages, and the inability of the researcher to situate the study in all contexts are explained. In the implications of the study, the researcher explains how language educators can use the findings of the study and how they can benefit from the findings of the study. Through the implications of the study, suggestions for developing the theories used in this study are presented. Finally, in the areas for further research, the researcher elaborates on the areas in mobile-assisted PBL, which should be subject to more research.

5.2 Discussion

This study revealed that mobile-assisted PBL could significantly affect the oral proficiency of Iranian EFL learners. It was also found that vocabulary knowledge, grammatical accuracy, pronunciation, and fluency are among the factors affected through mobile-assisted PBL. In addition, both positive and negative feedbacks were received from the respondents. The positive feedbacks included checking pronunciations through

recording conversations, easiness of online search, incidental vocabulary learning through an online search, realizing weaknesses, engagement with the learning content, the friendly learning atmosphere, increasing self-confidence, and enhancing listening while focuses on the speaking skill. The negative feedback received from the respondents include being time-consuming, limitations of the mobile-phones, less control compared to conventional classes, monotonous learning procedure, and difficulty in finding some materials for the conversations.

Studies dealing with PBL are scant. In terms of speaking proficiency, the scope of these studies becomes even more limited. Ansarian and Shir (2018), who conducted a review of PBL studies asserted that they had found 29 empirical studies dealing with PBL since 2001 in various EFL and ESL contexts such as Malaysia, Singapore, Taiwan, Thailand, Pakistan, Iran, and Nigeria. This is one of the main limitations in discussing the findings of this study. However, PBL has been implemented extensively in a variety of disciplines across the world, and this has also contributed to the broader understanding of PBL studies conducted in other disciplines in case they were found to be relevant.

5.2.1 PBL and Speaking Proficiency

Investigating the answer to the first research question, i.e., whether or not mobile-assisted PBL could affect speaking proficiency of Iranian EFL learners, revealed positive results. This effect was observed through both qualitative and quantitative results. Similarly, scholars in other disciplines have found positive effects of online and web-based PBL. For example, Ding and Zhang (2018) noted that web-based PBL is more effective than conventional instruction. In line with Ding and Zhang (2018), the findings of the current study revealed that mobile-assisted PBL is a suitable approach to enhancing speaking proficiency. Elsewhere, Barrows and Tamblyn (1980) and Engel (1997) suggested that PBL tends to increase confidence in students in speaking the target

language through the provision of a perfect milieu for students to practice their target language in communication. In congruence with them, the qualitative results in this study showed that learning to pronounce the words correctly gives the learners more confidence.

Moreover, Engel (1997) further remarks that the more confidence and enthusiasm the learners get from using PBL to learn the target language, the more likely they are to spend more time learning it, which will then improve students' language performance. Self-confidence was not under investigation in this study as a variable; however, it was mentioned very frequently by the respondents as the desired outcome of the course to the extent that they believed their speaking proficiency, especially fluency, was the result of their confidence in speaking. Thus, it can be concluded that this study is in line with Barrows and Tamblyn (1980) and Engel (1997).

In line with the current study, Kassem (2018) in Saudi Arabia who used a Hybrid PBL tutorship on speaking proficiency of Arab undergraduate students saw positive effects of his treatment. Wijnia, Loyens, Derous, and Schmidt (2016) believe that the reason for the effectiveness of PBL in any discipline is not only the use of cognitive and metacognitive skills. It is also related to the motivation of the learners to take a more active part in the learning processes. This motivation is among one of the themes extracted from the respondents' feedback in this study who felt more motivated to learn through PBL compared to conventional instruction. Shin and Azman (2014) also looked into the effectiveness of PBL on the speaking skill of Malaysian language learners. Though similar to this study, they could see positive results; they did not look into the components of the speaking skill.

5.2.2 PBL and Vocabulary Learning

Fard and Vakili (2018), who conducted a study on the effects of PBL on vocabulary learning, concluded that not only PBL can be used to enhance language learners' vocabulary knowledge, but also the learners have a positive view about PBL. They also mentioned that the learners receive various forms of feedback in PBL classes, which gives them more confidence in using their knowledge. In congruence with Fard and Vakili (2018), the researcher in this study realized that mobile-assisted PBL positively affects vocabulary learning of the language learners. One of the reasons found in this study through qualitative analysis was that the learners have the chance to find data from reliable sources (e.g., online dictionaries). In addition, they have the chance to recheck their findings with the group mates and receive feedback. The findings of the current study are also in line with Aliyue (2017), who notes that PBL can affect vocabulary usage by the learner when they write. L2 writers become more aware of their abilities and skills, and their metacognition is affected positively.

One of the issues that affect vocabulary knowledge of the language learners is having the chance to practice the vocabulary items in real communication (Laufer & Hulstijn, 2001). The participants in this study mentioned that mobile-assisted PBL allowed them to create their own conversations. The increase in the level of mobile-phone users' engagement through social media has not only been mentioned in studies in the field of language learning but also studies in the field of technology (Venkatesh, 2000). In the current study, not only the learners' engagement was increased in this study, but also their vocabulary knowledge was enhanced. Thus, it can be concluded that the results are in line with Laufer and Hulstijn (2001) and Venkatesh (2000).

Kumaravadivelu (2006) believes that increasing the chances of the learners to produce the language correctly can affect their proficiency. Calling this issue a common

shortcoming of the method era, which led to the post-method era, Kumaravadivelu (2006) mentions that language learning is effective once it is conducted authentically in practicum. Laufer and Hulstijn (2001) have a more in-depth look at this issue and explain that practicing the L2 while being involved in higher-order reasoning, gives the learners the chance to evaluate and monitor their learning. In congruence with Kumaravadivelu (2006) and Laufer and Hulstijn (2001), the researcher in this study found that the participants were involved in both evaluating the learning problem, and creating their own conversations. Thus, it is likely that the effect of PBL observed on their speaking proficiency is the result of more engagement with the target language and utilization of higher-order thinking abilities.

The respondents in this study noted that the learning problems presented to them were relevant to their real-life issues and they could situate themselves in the problem; as a result, they were not only more motivated to solve the problems, but also agreed that they could remember the conversations and vocabulary items. In congruence with these findings, Savery (2015) notes that contextualized and meaningful learning is more effective than many conventional approaches to learning that represent the content out of its context. Besides, Hmelo-Silver (2004) posits that if PBL problems are not relevant to the learners' real-life issues, the course can dubiously be called a PBL course. These findings also show that presenting real-life scenarios to the learners in this study must have been beneficial, and one of the leading causes of the observed effects.

Concerning vocabulary learning, Sun and Dong (2004) note that contextualized vocabulary learning can have more positive effects than the decontextualized learning of vocabulary. In line with these scholars, the researchers concluded that mobile-assisted PBL in a contextualized situation could have positive effects on the vocabulary learning

of Iranian EFL learners. Thus, it can be stated that speaking results in more retention of knowledge which was not investigated in this study.

One of the aspects mentioned in this study by the respondents, which had effects on their proficiency in using new vocabulary items, was the confidence gained from checking online native-like pronunciation and rechecking with the group members. Jin and Bridge (2016) argue that PBL creates a platform for low confident learners to gain more confidence in learning by being accountable for their own learning. The fact that the learners cannot hide behind other learners and are actively involved in the learning process fosters their learning (Wee & Kek, 2002). This issue was observed in this study concerning vocabulary learning, as the respondents mentioned that they benefited from other members in their groups and used their help to better express themselves. One way to do so was to check their newly found vocabulary items with them and practicing them with their group members before representing the conversation to the whole online class.

5.2.3 PBL and Pronunciation

In this study, it was also observed that mobile-assisted PBL could have significant positive effects on the pronunciation of Iranian EFL learners. The respondents in this study associated this issue by checking native-like pronunciations on the World Wide Web, which resulted in gaining confidence in using the words. Levis (2015) notes that listening to native-like pronunciations allows learners to evaluate their own pronunciation. Desjatnikova (2016) also mentions that English pronunciations have many variations, and this makes it for learners to master the pronunciations. A possible approach to solve this problem is to allow learners to evaluate their pronunciation against reliable sources. In congruence with Desjatnikova (2016) and Levis (2015), in this study, it was realized that checking the pronunciation by using valid online dictionaries such as the Cambridge dictionary can help pronunciation learning of the participants.

Siregar (2017) posits that the most critical factor in oral communication is pronunciation. Pronunciation contributes to speaking, and this issue was observed in the quantitative data analysis of the study, where an increase in both pronunciation and speaking proficiency was parallel. Othman, Wahi, Ya'acob, & Kofli (2017) also state that one of the common problems of non-native contexts (Japan in the case of their study) is lack of access to native-like communications which can affect the learners' speaking in terms of pronunciation. Congruent with Othman et al. (2017), it was realized that exposure to native-like pronunciation could affect pronunciation learning of Iranian EFL learners. Mubarokah and Listyowati (2016) lined this issue to feedbacks the learners receive in their classes from other peers and the teacher and assume that corrective feedback can affect pronunciation learning. It was among the issues mentioned by the respondents in this study as they believed that after checking the pronunciations in online sources, rechecking them with their group mates and practicing them within the private groups could have affected their pronunciation.

Reflection is one of the key characteristics of PBL, and it was observed that the participants' reflection on their pronunciations had helped them in pronouncing the words more accurately. The respondents stated that they had the chance to rethink their pronunciations before using roleplaying the conversations for the class. Hişmanoğlu (2006) states that self-monitoring and reflection are two characteristics of successful pronunciation learners; as a result, autonomous pronunciation learning is being encouraged by many language teachers. The learners could also reflect on the accuracy of their grammatical structures and vocabulary items through the class discussion.

One of the features of mobile-assisted PBL, which can have effects on not only pronunciation but also other linguistic components of language learning needs analysis of the learners. As content should be to the learners' real-life issues, they do not need to

learn a significant quantity of words to see which will be needed in their future communication. Instead, they learn fewer contextualized words, structures, and pronunciations, which can affect the quality of pronunciations when the number of items is more limited. PBL also does not oblige the learners to memorize a list of words or master a range of grammatical structures that they may not use at all. Instead, the learner targets the data they need and attempt to learn it. This situation is a desired learning situation, as stated by scholars in the fields of PBL (Hmelo-Silver & Barrows, 2006; Mathews-Aydinli, 2007) and language learning (Ellis, 2015).

5.2.4 PBL and the Listening Skill

In addition, one of the issues frequently mentioned by the respondents in this study was that mobile-assisted PBL had effects on their listening skill. Gilbert (2012) believes that listening skill and pronunciation are interdependent, meaning that if a learner acquires knowledge of pronunciation, he/she develops his/her listening skill. In congruence with Gilbert (2012), it is concluded that the respondents' view concerning the effects of this method on their listening is the result of the effects of mobile-assisted PBL on the pronunciation of Iranian EFL learners. Also, and as stated by Rivers (2018), listening and speaking skills are inseparable, as an act of communication requires both listening to others and responding to them. This situation implies that the rise in one of these skills should also cause a rise in other skills. This issue was observed by Remedios, Clarke, and Hawthorne (2008), who studies Asian students in the Western context for two years.

5.2.5 PBL and Spoken Fluency

One of the main themes in the respondents' feedback in this study (also observed quantitatively) was the effects of mobile-assisted PBL on the spoken fluency of the participants. Although the effects of PBL on spoken fluency can be traced in the early

works of Abdullah (1998) and Abdullah and Tan (2003) who believed that PBL is a suitable approach to learning in many disciplines, as it facilitates communications. Other scholars in the field of PBL also mentioned that this approach could have effects on fluency of the language learners. For example, Sy, Adnan, and Ardi (2013) noted that by using PBL in a language class, the learners could more fluently describe places. Besides, Elizabeth and Zulida (2012), who incorporated PBL in an English for Specific Purposes (ESP) course in Malaysia, concluded that PBL could affect linguistic features of PBL, among which fluency can be highlighted. Hilton (2008) noted that spoken fluency, per se, is affected by several other features among which knowledge of vocabulary and grammar can be highlighted. As the researcher in this study observed that mobile-assisted PBL has effects on both vocabulary and accuracy of grammatical structures, the effects of his approach on the spoken fluency of the learners can be justified. McCarthy (2006), however, looks at this issue from a different perspective.

To him, fluency is the result of self-confidence in speaking, an issue which was noticed in the case of this study, as not only the researcher observed that PBL affects the spoken fluency of the learners, but also, it had resulted in more self-confidence among the learners. Wang (2014) notes that spoken fluency is not only affected by linguistic and affective factors, but also by cognitive factors. The speakers' ability to use cognitive thinking skills gives them more ideas to discuss; as a result, their spoken fluency can be affected. This issue can also justify why the learners became more fluent through PBL. Unlike many conventional approaches to language learning which provide the learners with one fixed conversation model, PBL provides the learners with open questions that can be solved through a variety of responses. It is the learners' use of cognitive thinking skills that can determine how effectively the problem can be solved. The constant utilization of one's cognitive thinking skills can increase his/her problem-solving ability and, as a result, give the person more ideas to approach a learning problem.

On the other hand, mobile-assisted PBL is a cognitive approach to learning. The use of higher-order thinking reasoning in this approach aims at guiding the learners to decode the topic and identify what needs to be elaborated on. Therefore, the results observed on the spoken fluency of the participants in this study can also be linked to the use of cognitive thinking.

5.2.6 PBL and Accuracy of Grammatical Structures

Another speaking component positively affected by PBL in this study was the accuracy of the grammatical structures. Cui (2016), who also delved into the effects of PBL on the grammatical accuracy of the Chinese EFL learners, posits that PBL affects both written and spoken vocabulary and grammar usage among the learners. In line with Cui (2016), who conducted a mixed-method study and used an analytical scoring procedure to score grammatical accuracy, a fewer number of mistakes were made by the learners. The respondents in this study linked this issue to have the opportunity to be involved in different forms of interactions (monologues, dialogues) and with different people.

The movement from deductive to inductive teaching of grammar, which took place in the 20th century, could per se reveals that reflection of grammatical rules can increase the accuracy of grammatical structures among L2 learners (Haight, Herron, & Cole, 2007). Inductive learning gives the learners the chance to think and analyze examples of the sentences they encounter to come up with the general rule that governs the sentence instead of being provided with the rule from the very beginning. PBL acts similarly; the learners do not receive the grammar rule from the teacher. They feel the need for the structure or encounter examples of similar sentences online and adopt it in their conversation. The fact that the respondents in the current study enjoyed incidental

learning proves that at least part of learning in PBL is relevant to learning from samples of sentences rather than using rules.

5.2.7 PBL and Task Achievement

Task achievement was among the components of speaking, which was not significantly influenced by PBL in this study. In this study, task achievement was defined as, in the general sense, as 'communicative success' or the ability to provide an answer to the given questions by getting the message across in a way that results in effective communication. Although the participants showed a high level of self-efficacy in this study by completing the learning tasks, no significant difference between the scores of the control group participants and experimental group participants was observed. The literature on the effect of teaching and learning approached on task achievement shows that task achievement is among the variables which is profoundly affected by low-level learners (Council of Europe, 2001). This can explain why task achievement was not affected in this study. More exploration of the effects of PBL of task achievement requires a study that considers proficiency level as a variable. Also, although the researcher in this study considered task achievement as a rubric, in the IELTS exam, task achievement is only considered as a rubric in the writing section of the test. This justification may also explain why the effect of task achievement on the speaking proficiency of the participants was not significant.

5.2.8 PBL and the Learning Content

McLean, Van Wyk, Peters-Futre, & Higgins-Opitz (2006) remark that one of the main restrictions in conducting PBL classes is the availability of the learning content. Unlike many conventional courses in which the content is prepared by the material developers and is presented to the learners, in PBL classes, the learners are asked to source the

required content independently and interact with their groupmates to find the most relevant and useful information (Neville, 2009). This justification indicates that PBL learners should have searching skills, and tutors should check for the availability of data while designing the PBL questions. It also indicates that PBL tutors should equip their learners with proper searching skills. In this study, some respondents stated that they needed prepared data and that they felt restricted by online search (n=6). This restriction may be the result of these learners' inability to conduct an online search. In line with this study, Jin and Bridges (2016), who also conducted a study on PBL in health science and reviewed several PBL studies, concluded that one of the problems frequently mentioned by students in medical sciences is that PBL tutorship without prepared materials is hard to conduct.

5.2.9 Relevance of PBL to the Real Life

Another feature of the PBL approach, which was highlighted by respondents, was the real-life learning scenarios. The respondents remarked that PBL provides them with various scenarios that might occur concerning a particular learning problem. Tan, Van der Molen, and Schmidt (2016) also remarked that one of the goals of problem-based learning in any discipline is to remind the learners that real-life situations are not fixed, and their decision affects the scenarios they will encounter. They also observed that the learners appreciate the variety of learning situations that occur through PBL and that it contributed to the formation of their professional identity. Although utilization of real-life problems is a crucial and integral part of PBL tutorship, this has been given little attention in the field. Many of the studies that have been published on PBL have not discussed the authenticity of the learning problems. Among the recent studies with such a feature is the one conducted in the context of Saudi Arabia by Kassem (2018).

5.3 Summary of the Findings

The study entitled, "The Effects of Mobile-Assisted Problem-Based Language Learning on Speaking Proficiency of Iranian EFL learners" had three objectives. The first objective was to find out how Mobile-assisted PBLL affects the spoken proficiency of Iranian EFL learners. The secondary objectives of the study were to investigate which aspect of speaking proficiency of Iranian EFL learners, i.e., the accuracy of grammatical structures, pronunciation, vocabulary, fluency, and task achievement, is affected by mobile-assisted PBLL. Thirdly, this study aimed at delving into the views of Iranian EFL learners regarding mobile-assisted PBLL.

In order to fulfill the objectives of the study, the researcher designed a PBLL model based on previous models existing in the field. To determine the number of participants for this study, the researcher conducted a power analysis.

Through power analysis, it was understood that at least 30 participants are required in each group to conduct the study. Thus, this study began with an initial population of 101 language learners to whom the researcher had access (convenience sampling) as it was likely to encounter the attrition effect which is an inevitable part of almost any empirical study, the researcher aimed at beginning the study with more participants in each group. In the first session of the study, consent form (in the participants' native language) and the placement test (OPT test) were administered. Eighty participants (n=80) whose scores fell in the range of intermediate level learners were selected for this study. These participants were given an IELTS speaking test (part 2 and 3) as both the homogeneity test and pretest. Based on the results of this test and by considering five different components of the speaking proficiency, i.e., vocabulary, grammatical structures, fluency, task achievement, and pronunciation, they were divided into two groups with no statistical differences.

Having selected the participants in the control group, they went through the conventional discussion class in the language institute. They went through 16 sessions of classes (following the language institutes schedule). In the control group, the participants were given a discussion topic by the teachers through the Telegram application one day before the online class. They were asked to carefully read the topic and prepare themselves for discussing the topic the day after. The following day, they were asked to discuss their ideas about the topic. The teacher actively participated in the conversations and provided the participants with the necessary help concerning the language. The control group had certain features, i.e., a) the teacher was the main authority in the class, 2) corrections were made by the help of the teacher, 3) topics were selected by the teacher, but 4) content was collected by the participants. And the teacher.

The topics selected by the teachers were from the main language series taught in the institute. Indeed, the main objective of the free-discussion course to remind the participants of the previously studied materials. Every session lasted for 1.5 hours, and the following steps were taken in conducting the control classes:

- 1) The teacher asks the participants questions about the previously introduced topic (schema activation).
- 2) The teacher wrote the word on the board and asked the students to brainstorm.
- 3) The participants were asked to discuss each aspect of the topic by taking turns. They should have justified their opinion.
- 4) As the teacher observed the need for new vocabulary, she (the teacher) introduced the vocabulary by writing it on the board.
- 5) The participants were asked to use the new vocabulary item in their speech meaningfully.

The participants in the experimental group were asked to make sure they have installed Telegram software on their mobile phones. Telegram is the most widely used mobile

application in Iran, and most mobile phone users know how to work with this application. By using this software, the participants can type their answers, send a voice message, or send a video of themselves instantly.

All participants joined the online class (n=37). Also, every two participants were asked to form an online group by creating a private chat on Telegram. The reason for selecting 2 participants for each group is that for most conversations, only two learners are required. All participants were given an ill-structured problem at the beginning of each session. They were asked to analyze the topic individually. After the analysis, they should have identified what they knew about the problem and what they needed to know about the problem. They could carry out an online search for this reason. Having conjectured about how the problem could be solved, they were asked to share their opinions with their group mates in their groups and attempt to create a plan (conversation plan). They were supposed to make use of their group mate's ideas to enhance the quality of the conversations. Among the vocabulary items and grammatical structures selected by both peers in the group, a few were shortlisted and used in designing the conversations. Having produced the conversation, they were practiced in the group and were later presented to the group members in the main online class group. All participants gave and received feedback on the conversations. Later the participants had a short discussion through which they were asked to reflect on their learning and the lesson.

Three different posttests (IELTS speaking part 2 and 3) were also administered to the participants in this study. The results of these three tests gained from the control group and the experimental group were used to answer research questions 1 and 2. In addition, a semi-structured interview was conducted twice in this study, once in the middle of the treatment, and once at the end of the treatment. The results gained from these two studies were used to answer the qualitative question posed in this study research question 3).

Having conducted the data analysis through MANOVA to answer the quantitative questions and qualitative content analysis to answer the qualitative question, it was revealed that mobile-assisted PBL could positively affect the speaking proficiency of Iranian EFL learners. It was also observed that mobile-assisted PBL could significantly affect most components of speaking proficiency, i.e., the accuracy of grammatical structures, vocabulary items, pronunciation, and fluency; however, in terms of task achievement, no significant effect was observed. It should be mentioned that all oral posttests and the pretest were rated by three experts in the field after the processes of external and internal moderation to make sure about the reliability of the results.

The qualitative data collection continued until the point of data saturation was reached with 17 respondents from the experimental group. The reason for selecting the respondents from the experimental group was that they had experienced mobile-assisted PBL, whereas, the other group (control group) did not have this experience. The main themes extracted from the respondents' feedback with samples of their speech are revealed in Chapter 4 in detail. Briefly speaking, it was found that the participants' view concerning mobile-assisted PBL is mostly positive. They believed this approach provides them with more practice in the form of monologues and dialogues to deal with real-life issues. They also believed that their weaknesses are revealed to them. Additionally, they stated that mobile-assisted PBL increases their self-confidence, provides them with opportunities to check their pronunciations with peers in the class, and compare them to valid online sources, affects their incidental vocabulary knowledge, and affects their listening and speaking proficiency at the same time.

5.4 Limitations of the Study

There are several issues in this study that limited the performance of the researcher. While such limitations are an integral part of any research, the most important ones are explained in this section. For example, Iranian EFL learners come from various

ethnicities, Fars, Turk, Persian, Kurd. For some of these learners, English is L2, and for some others is L3. The results of learning a language as L2 might be different from learning L3; however, the researcher could not gauge this effect in this study. This study was conducted in the city of Tehran, where the majority of learners speak only Persian as their first language. Thus generalizing the findings of this study to all Iranian EFL learners may require caution.

Besides, the researcher wished to have access to a larger sample of Iranian EFL learners; however, the limitations caused by the limited budget of this project, and also difficulty in acquiring permission from some language institutes resulted in focusing on one educational system. As a result, non-random participant selection was opted instead of a random one.

Moreover, the researcher in this study was limited to English and Persian documents, as the researcher did not have sufficient knowledge of other languages to review the documents in them. Also, although the researcher searched for the documents in scientific databases such as Science Direct, Oxford Journals, Wiley Online Library, and Sage journals, there may be more databases and libraries to which the researcher did not have access.

Also, as this study was an investigation of the implementation of mobile-assisted PBL in language classes in Iran, the context of the study was confined to Iranian EFL contexts. In addition, in conducting the literature review, the researchers' focus was on EFL/ESL contexts. However, PBL is not confined to these contexts and may have been implemented in other Western contexts as well.

One of the issues encountered during this study was the limited number of participants due to which the researcher had to reduce the number of research questions. For example, had the researcher access to more male or female language learners, the results could be distinguished based on gender.

5.5 Pedagogical Implications

This study can have pedagogical implications for language teachers, language learners, test-takers, material developers.

Language teachers who wish to employ a cognitive and collaborative approach to language learning can utilize the model discussed in this study. The model identifies which steps should be taken to implement PBL correctly. The teachers can also use the ill-structured problems presented in this study as sample problems to design their PBL questions. One of the features of PBL, which can benefit language teachers, is the clarity of roles. The teachers in this approach know what to expect from the learners. The division of roles in the class and the quality and timing of the aid the learners need through feedback is also made clear to users of the model.

Informing the language learners about the findings of this study can also be beneficial. Unfortunately, one of the problems of language learners is that they bring many expectations with themselves to the language classes, and do not feel accountable about their learning as much as they should feel the responsibility. However, PBL is an approach to learning which emphasizes self-directed and autonomous learning. Learning English through PBL should increase the learner's cognitive and metacognitive skills as observed in the literature, and prepare them for more useful language learning.

The results gained from this study can remind the language test makers that focus should be accorded to the actual performance of the language learners (proficiency) rather than grammar and vocabulary knowledge. Using the results of the study, the test takers should know that the aim of PBL is the retention of knowledge; thus, testing the learners' memory is not congruent with PBL assessment. They should design tests that assess the learners' ability to solve real-life problems through communication in the target language. Probably one of the primary cohorts of educators who can benefit from the findings of this study is material developers. At the time of conducting this study, most language

teaching and learning materials provided to the learners included decoded data such as grammar lessons and vocabulary items with photos and audio pronunciation files. Such data can hinder higher-order thinking among the learners by presenting the knowledge to them instead of a learning problem. Material developers, thus, should fill this gap in the field of PBL and prepare learning materials for the learners who are not very suggestive but can give an organized structure to their search and reasoning.

5.6 Theoretical Implications

This study was based on the Higher Order Thinking theory and the Social Constructivism theory. These two theories are among the most fundamental theories used in the fields of language learning and education across the world and have been mentioned and implemented in numerous studies. However, these theories were brought up decades ago, and the role of new research findings is still missing in these theories. For example, since every step was taken in higher-order thinking and socialization can be facilitated by technology, there is a need for a new theoretical model to redesign these theories by considering the role of technology. It should be mentioned that such theories exist in areas other than education, such as media, but are rarely used in the field of language learning. A missing concept in these theories is the difference between having an intention to learn and having the freedom to learn. Technology has provided users with the freedom to search and has broken the boundaries of the physical atmospheres. The mobile-assisted PBL presented in this study can be considered an updated version of higher-order thinking and social constructivism when merged with technology. This model can be used as a basis to implement mobile-assisted pedagogy.

Another aspect that should be added to the existing theories is the acceptance of technology among the users in language classes. As observed in this study, some learners did not have a positive view about the use of mobile phones as learning devices. This

issue can affect the outcome of the PBLT tutorship. In this regard, Davis, Bagozzi, and Warshaw (1989, p.343) state that:

Because new technologies such as personal computers are complex and an element of uncertainty exists in the minds of decision makers with respect to the successful adoption of them, people form attitudes and intentions toward trying to learn to use the new technology prior to initiating efforts directed at using. Attitudes towards usage and intentions to use may be ill-formed or lacking in conviction or else may occur only after preliminary strivings to learn to use the technology evolve. Thus, actual usage may not be a direct or immediate consequence of such attitudes and intentions.

Such considerations about the acceptance of technology have led to designing a Technology Acceptance Model by Davis, Bagozzi, and Warshaw (1989). While this model is usually used in media studies, it is rarely used in the field of language learning and teaching. This model reminds the readership that acceptance of technology can affect the behavior of the users; thus should not be taken for granted. The theory is considered an extension of 'Theory of Reasoned Action' and Davis's (1989) acceptance model (Davis, Bagozzi & Warshaw, 1989). It is also suggested that the Technology Acceptance model should be implemented in forms of blended learning. To solve this problem, the research model proposed in this study can be used, meaning that not only mobile-assisted pedagogy is implemented, but also the behavior and views of the learners' are sought through interviews.

5.7 Areas for Further Research

Problem-based language learning is a new concept in the field of applied linguistics. As a result, many issues should be determined with regard to PBLT. In this study, the researcher was limited to speaking proficiency as the main dependent variable. Therefore, there is a need for studies to determine, for example, how PBL can affect coherence and cohesion in writing, or how PBL affects the reading skill.

There are a number of issues to determine about the learners in PBL classes. PBL requires the learners to use their cognitive abilities to solve real-life problems, and not all learners show the same level of cognitive thinking abilities, as there might be intricacies between this issue and the language learners' proficiency level. This aspect was not investigated in this study. Future studies should attempt to find out the language learners at which proficiency level benefit from PBL more than the others, or whether or not learning through PBL is hard for some learners at particular proficiency levels. In addition, studies dealing with the gender and age of the learners and PBL are very rare.

Other than investigating the possible effects of PBL on language skills and subskills (other than speaking), the researchers can look at the PBL processes in their classes. They can attempt to see the dynamics of interactions between the learners in PBL classes. There is also a need for studies that can see how the learners argue over selecting materials to be used in their conversations and to be presented to the class. To do so, the researchers may need to video-record the sessions, which was not possible for the researcher in the current study.

One of the issues which is also related to the concept of cognitive thinking is the learning style. Wang, Wang, and Huang (2008) advocate the idea that learning styles can affect the learners' intake of language, and learning should accord with the learners' style. Although this issue is among the controversies in the arena of language learning, insufficient researcher has dealt with this issue and PBL. Some learning styles, such as impulsivity vs. reflectivity or introversion vs. extroversion, are among cognitive styles, and priority can be given to investigating these learning styles, and how they can affect learning through PBL. However, in the current study, the researcher was limited by the number of participants and could not group the learners based on their learning styles.

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