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MALLO: A New Paradigm for Ubiquitous Language Learning

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Abstract

One of the greatest advantages of mobile language learning is its ease of access, especially to learners in the 21st century who have the option of selecting any learning content that matches their preferences or language development goals, anywhere and at any time. Mobile-assisted language learning or MALL takes learning beyond the classroom, which imposes spatial and temporal constraints. This study aims to investigate components of language learning with a mobile-assisted design, and develop and evaluate a mobile-assisted English language learning and teaching innovation, namely Mobile-Assisted Language Learning in Open Resources Environment or MALLO for high-school English as a foreign language (EFL) students. MALLO is a research-based application which employs Exploratory Factor Analysis (EFA) in its development to identify significant components. The participants in this study consist of two sample groups: 1,500 high school students from six regions of Thailand to explore the components; and 300 students to examine MALLO users' satisfaction Both were selected via the stratified sampling method. After that, nine experts evaluated MALLO in terms of its components, its support for English language learning, its functions, and its application for English language learning. The results indicate that MALLO is comprised of four important components: mobile English learning resources, the use of MALL, mobile technology, and portal collective tools. The results also show the satisfaction of learners as users of the MALLO application at high levels with an average of 4.05 to 4.15. In the final stage, the MALLO application was evaluated by nine experts and the results were also in the range of high or very high levels across all aspects, with an average rating of 4.444.72.

INTRODUCTION

In the digital era, computers and the Internet have changed the nature of teaching considerably. One particular example is the use of innovations in mobile language learning to encourage people to learn languages with portable devices such as mobile phones, tablets, etc. (Hashim et al., 2017; Soleimani et al., 2014; Turc, 2017), which are learning innovations developed from the use of computer-assisted language learning (CALL) (Shanmugapriya & Tamilarasi, 2013).

Mobile learning is considered an evolution in e-learning that became truly viable when the size of required devices was reduced, making it easy for learners to take the devices with them anywhere, providing them with the ability to learn at any time (Sofwan et al., 2021; Traxler, 2013; Traxler et al., 2015). Mobile learning activities can contribute to the users' knowledge or skills, and these can be gained using the portable devices.

Mobile-Assisted Language Learning (MALL) is an evolution in computer-assisted language learning, in which mobile learning technology is utilized in order to assist students in learning languages, enabling them to gain access to various forms of media, and communicate with their teachers or other students from anywhere and at any time (Agnes & Shield, 2008; Arvanitis & Krystalli, 2021; Kalambaeva, 2013). Furthermore, Stockwell and Hubbard (2013) argue that MALL, having been developed over many years, has become pervasively adopted. However, despite its contributions to language learning and teaching, studies examining the use of MALL have been rather limited. According to Gillespie (2020), existing empirical studies concerning this issue are mostly on a small scale, and they rely on data from a single institution or a small group of students within a short period of time.

Regarding the characteristics of MALL, Yaman (2016) suggests that, apart from the synchronous connection on the Internet network, MALL should be made more useful by including the asynchronous connection. Yaman (2016) also discusses the benefits of MALL and provides recommendations on how to design effective MALL applications. He suggests that MALL should have its contents arranged in the form of modules, integrate classroom learning with online content, promote collaborative learning, facilitate students' access to data and learning content, create various forms of learning, provide timely responses to learners' progress, enable interactions between learners and the learning contents, bolster learners' autonomy in seeking and gaining knowledge, constantly arouse learners' interest, act as a medium between learners and teachers, exhibit the qualities of being exclusive and adaptive to each learner's desires to learn, maintain its quality of being conveniently portable, and encourage learners to produce their own work using the learnt knowledge.

Shadiev et al. (2022) reveal that learners who use mobile learning can enhance their writing, as well as experience the advantages of using the mobile network in learning. The decision to apply the innovation of mobile language learning in instruction has been proven to be effective, especially when it is integrated into classroom learning (Baleghizadeh & Oladrostam, 2011). Elaish et al. (2017) and Klopfer et al. (2002) state that teaching that involves MALL needs to have its major components focus on the use of mobile devices. In other words, the mobile devices in use must be portable, enable connection and communication between users, be able to promptly send and receive data from anywhere and at any time, gain access to shared information, and support learners' individual use (Nuraeni et al., 2020).

One major advantage of learning through portable devices aforementioned in the previous studies is that learning can be highly personalized. While studying, learners are free to choose their desired subjects and the learning pace at which they study. They can choose to learn fast or slowly, depending on their comfort level. The fact that learning only requires portable devices provides learners with opportunities to study anywhere and at any time, prepare

themselves for a lesson beforehand, and review what they have studied while traveling. Mobile learning can also benefit teachers; the teachers are free to prepare their lessons outside their offices. All of these changes are made possible thanks to the advent of portable devices (Watson & White, 2006).

Components of the mobile English learning innovations

The field of MALL had begun gaining traction since 2008, when mobile communication devices were being developed significantly. Later, the use of portable devices for communication and development of learner proficiency increased rapidly both in self-learning and in team-driven learning. Despite the pervasive use of mobile devices for communication, some improvements in terms of educational uses were suggested by previous studies. For instance, Liu et al. (2016) suggested the use of mobile English learning should be flexible and more tailored-made to each person's style of learning. Traxler et al. (2015) suggested the direction of MALL research should be conducted towards historical contexts, the building of learning communities, and examination of the expansion and learning that can take place anywhere and at any time. In a related study, Sung et al. (2015) synthesized meta-analysis works concerned with MALL in language teaching and found that MALL contributed to the overall language ability improvement with an effect size of 0.55. In another study, Yükselir (2017) analyzed data regarding the use of MALL in an English as a foreign language (EFL) learning context with a qualitative approach and found that MALL helps develop language skills, especially those in listening and speaking—particularly, the pronunciation and vocabulary skills.

Regarding the essential design components of learning through MALL, Peng et al. (2021) stated that types of activities, modalities of delivery, and duration treatment influenced the use of mobile network to complement learning. Al-Otaibi et al. (2016) argued that the use of mobile devices in teaching the English language could be improved by means of mobile lab systems, which would replace the traditional lab, and called them Mlabs, which would be based on the notions of labs that could be accessed from anywhere. Lilley and Hardman (2017) incorporated the use of mobile learning in conjunction with dictionaries while teaching an Advanced EFL class in South Africa. Viberg and Grönlund (2017) presented their survey results about the primary requirements of mobile teaching designs for EFL learners focusing on online teaching and mobile learning for students of higher education; it was found that designing lessons for mobile learning should consist of three different aspects: 1) learners had to use their personal mobile devices more often when doing learning activities by themselves, 2) mobile devices were necessary for honing skills, and 3) learners preferred to study by themselves due to the lack of time limitations. García Botero et al. (2018) collected data from 118 higher education students using Duolingo Dashboard, which proved effective in tracking learners' progress, and found that mobile learning was effective. They found that motivation for learning, self-prioritization, and self-management in using mobile networks increased when users were not studying in the classroom. In addition, Ozer and Kılıç (2018) showed that the environment offered by mobile learning did not affect the cognitive load but significantly contributed to academic improvement. In addition, the interaction with the learning materials can also be observed. Palomo-Duarte et al. (2016) reported about the use of applications as a base of mobile learning, which could be a tool that helps teachers to trace their students' interactions

in order to pave the way for their intended objectives. The applications were divided into two groups: the teachers' and the students' applications. Also, they used a web portal, which was user-friendly.

When considering features of mobile learning as a complement to English learning, the researchers came across some possible issues and trends, which can be summarized as follows:

1) The issues are concerning the limited content and choosing suitable subject matter for students' learning with appropriate mobile devices. Additionally, creating appropriate learning content can incur a high cost.

2) There is a limitation regarding the applications needed for mobile learning. No guidance based on English-acquisition theories as to what types of application should be used, what attributes they should have, how they are supposed to efficiently bolster language learning and be adapted to suit each student, and how they can promote teaching has been provided.

3) Despite a large number of devices connected to the Internet, the mobile language learning being used nowadays still lacks supporting research. Mobile technology has been developing continually but not consistently, which poses challenges for researchers developing innovations in mobile English learning for learners of EFL.

A majority of the currently used applications are commercial in nature such as Duolingo or Rosetta Stone (Eiammongkhonsakun, 2023). Additionally, in Thailand, the Ministry of Education has launched national-level projects; however, these projects lack a strong research foundation when employed for practical use such as the Echo English application (Srithongkul, 2019). Therefore, it is necessary to conduct the research to explore what MALL applications respond to the needs in a real-world language learning setting. Thus, the development of MALL applications as innovations is needed in order to overcome these limitations.

In this study, to benefit EFL learners in Thailand, the development of research based applications for Mobile-Assisted Language Learning in Open Resources Environment (MALLO) as innovation opts to use the Common European Framework of Reference for Languages (CEFR), a standard English proficiency framework of reference (Council of Europe, 2011) as guidelines for English learning resource selection in the design of innovations. The European language framework or CEFR is used as criteria in Thailand to measure the English language proficiency of teachers and learners. With the CEFR, teachers and learners are informed about the suitable levels of proficiency of content to learn.

The objectives of the study are to explore the components of MALL applications as an innovation for English language learning and teaching, to uncover the design and development behind MALL applications as an innovation, to study users' satisfaction levels for MALL applications as an innovation, and to examine the experts' evaluation levels for MALL applications as an innovation.

As we have identified innovations in MALL in different countries but, not in Thailand, we are interested in finding answers to the following questions:

1. What are the components of MALL applications as an innovation for English language learning and teaching in Thailand?
2. What are the design and development of MALL applications as an innovation based on the components?
3. What are the users' satisfaction levels for MALL applications as an innovation in Thailand?
4. What are the evaluation levels for MALL applications as an innovation by the experts?

METHODS

This study employs a research and development design with quantitative analysis. The study was conducted in two main phases: The first phase was to explore components of the MALL applications as innovations by using Exploratory Factor Analysis (EFA), and then design and develop the MALLO applications as innovations. EFA is a multivariance statistical method used to identify the smallest number of constructs known as factors, dimensions, latent variables, synthetic variables or internal attributes (Watkins, 2018). Mean and standard deviation are also analyzed to explore the satisfaction levels of learners as users after experiencing MALLO applications.

Participants

To determine the appropriate sample size for this study, Yamane's formula was employed. According to Yamane (1967), the sample size is calculated to ensure it is representative of the population. In this study, with population size above 100,000 and with a degree of 97% level of confidence, the sample size was 1,111. Therefore, the 1,500 upper-secondary school students from twelve schools across six geographical regions in Thailand: Central, Eastern, Western, North-Eastern, Northern, and Southern regions were included as participants in the study. A total of 250 students in both public and private schools from each region were randomly selected to participate in the study using stratified random sampling. The selection criteria were as follows: EFL setting in the school curriculum, the school's accessibility to the 3G and 4G telecommunications network coverage, and the school learning facilities, computer rooms, the Internet, and mobile networks or WIFI. After that, to explore the satisfaction of the users, 300 upper-secondary school students from the six regions of Thailand under the previously mentioned criteria were purposively selected, with the number of 50 students from each region from both public and private schools. In addition, 9 experts were invited to evaluate the appropriateness of the MALL innovation, namely MALLO.

Instruments

Instruments used in collecting data are as follows.

1) A questionnaire to explore the components of the innovation for English language learning. The questionnaire was developed based on the national and the international educational policies regarding English language instruction, MALL theories and language learning theories more generally. From the theoretical review, the questionnaire constructs are related to concepts of constructivism namely autonomous learning, the scaffolding process, authentic assessment and gamification. The results from the questionnaire mandate the design and development of MALLO. The questionnaire consists of 89 questions using 5 Likert scales.

2) A questionnaire to explore the satisfaction of users after using MALLO. The questionnaire developed in the study consists of 40 questions investigating users' satisfaction across four aspects, namely the quality of MALLO, the MALLO efficiency, the usability of MALLO, and the support for English language skills development of the MALLO applications. This questionnaire also uses 5 Likert scales.

3) A MALLO evaluation inventory was developed and used to examine MALLO in terms the components, the support for English language learning, the functions, and the applications for English language learning by the 9 experts: 5 experts in the field of English language teaching, and 4 experts in the field of educational technology. The experts were selected by their teaching experience and respective fields of expertise.

The questionnaires and the evaluation inventory were validated and the IOC value was within an acceptable range (0.66-1).

Procedure

The components of the MALLO applications were examined among 1,500 students from across six regions in Thailand to help design and develop the innovation for EFL learners. The questionnaire results were then analyzed through the means of EFA. After that, the results obtained were used by the researchers to draft, design, then develop the prototype of MALLO. This includes the site structure and the wireframe of the "MALLO" applications. After that, the prototype was sent to nine experts to assess its quality. In the final process, MALLO was implemented for use by 300 students from across six regions in Thailand to examine their satisfaction levels. Additionally, the nine experts: five in the field of English language teaching and four in the field of educational technology were asked to evaluate MALLO in terms of the components, the support for English language learning, the functions, and the applications for English language learning.

Analysis

The data analysis consists of using EFA to explore the components of MALLO. The number of the factors, the Eigen value, the percentage of variance, the cumulative percentage of variance, and the factor loading were all taken into account. A correlation matrix was used in the EFA process to illustrate the relationship between individual variables. Therefore, KMO (The Kaiser-Meyer-Olkin) and the Bartlett's Test of Sphericity were used to test the suitability of the respondent data for factor analysis (Williams et al., 2010). Next, the orthogonal rotation was

analyzed by means of the Varimax method. Finally, mean and standard deviation were employed to examine the satisfaction of users with the MALLO application.

RESULTS

RQ1: The components of the MALLO for English language learning and teaching

The results of the EFA from the questionnaire distributed to the 1,500 students from the six regions of Thailand are displayed as follows.

Table 1
Demographic data

Variable	Description	Number	Percentage
Gender	Male	634	42.3
	Female	866	57.7
Grade Level	Grade 10	614	40.9
	Grade 11	469	31.3
	Grade 12	417	27.8
School Type	Government School	751	50.1
	Private School	749	49.9
Region	North	251	16.7
	Central	249	16.6
	Northeast	250	16.7
	South	250	16.7
	East	250	16.7
	West	250	16.7

To begin with the demographic data of the research participants, most of the students responding to the questionnaires are female, 866 persons or 57.7 percent, and the number of the male students is 634 or 42.3 percent. The number of the students studying in secondary four is the highest at 614 students or 40.9 percent. The second-highest number of the students belongs to those in secondary five, 469 students or 31.3 percent, and the smallest number of students is those in secondary six, with 417 students. 751 of the students, or 50.1 percent, are from public schools, and the other 749, or 49.9 percent, are from private schools. Most of the students are from the Northern region, 251 students or 16.7 percent, following by those from the North-Eastern region, the Southern region, the Eastern region, and the Western region, of which numbers are equal at 250, or 16.7 percent each. The least number of the students, 249 or 16.6 percent, are those from the Central region.

To respond to RQ1, it was found that the correlation coefficient between questions in the analysis of the components of MALLO is between 0.33 and 0.84 and the statistical significance is 0.5. To explore the components of MALLO, the researchers dissect the questionnaire items by means of the principal component analysis, and analyze the orthogonal rotation by means of the Varimax method.

In the exploratory factor analysis to find the components of the applications, the results of the factors, the Eigen value, the percentage of variance, the cumulative percentage of variance, and the factor loading of the questionnaire are as follows.

Table 2

Results from the statistical significance of the correlation coefficient between questions by means of using the KMO (The Kaiser-Meyer-Olkin) and the Bartlett's Test of Sphericity

Statistics	Results
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.99
Bartlett's Test of Sphericity Approx. Chi-Square	94,903.69
Df	3,916.00
Sig	0.00

The results show that the initial communalities of all questions before extracting the components derived from the principal factor analysis (PCA) are 1.00, and after the extraction of the components, the communalities are between 0.44 and 0.80, which are above 0.20, indicating that the questions are suitable for further analyses.

Table 3

The number of the components, the Eigen value, the percentage of variance, and the cumulative percentage of variance of each of the factors

Factors	Eigen Value	Percentage of Variance	Cumulative Percentage of Variance
1	50.10	56.29	56.29
2	3.36	3.77	60.06
3	1.77	1.99	62.05
4	1.39	1.57	63.61
5	1.06	1.19	64.80
6	1.03	1.15	65.95

According to Table 3, when considering the Eigen values which are not less than 1.00—in other words, the sums of the squares of each of the components' coefficient that are over 1.00—the researchers isolated six components. When considering all six components, it was found that the cumulative variance of the six factors grouped by the analysis is 65.95 percent of all the variances. It can be explained that the factor to determine the components of the MALL

innovation is 65.95 percent. The factor loadings of the six factors, after the orthogonal rotation using the Varimax method of the qualified variances (their loadings are over 0.30), are as follows (see Appendix).

Table 4

The total numbers of the factors and the variances

Component	Total Number	Variance(s)
1	40	No. 42-43, 48-53, 55-59, 61-64, 66-87 and 89
2	23	No. 1-15, 17, 21, 24, 26-27, 41, 44 and 65
3	17	No. 16, 18-20, 22-23, 25, 28-34, 45-47
4	6	No. 35-40
5	2	No. 54 and 60
6	1	No. 88

After considering the 89 variances in the questionnaire, it was found that there are six apparent factors of which the factor loadings are not less than 0.30. However, there are also factors which value less than three variances. They are the fifth and the sixth factors, respectively. Since the values of variances are less than the requirements, they are considered eliminated. Hence, the total number of factors is four factors. The total number of the first, the second, the third, and the fourth's variances is 86. The researchers then used the screen test to analyze all the factors, and finalized the components for the MALL application as an innovation, shown in Figure 1.

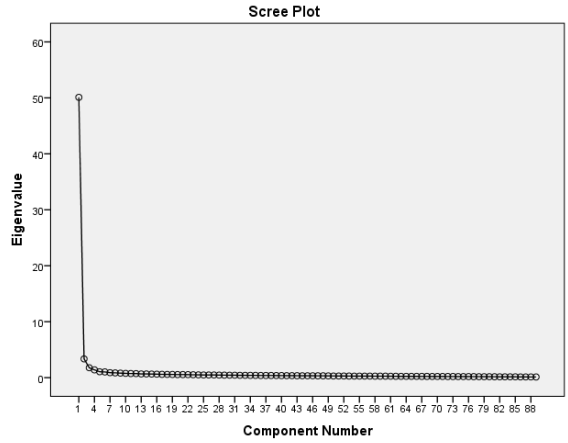

Figure 1 The Eigen values of the components of the innovations in mobile English teaching

The analysis from Figure 1 indicates the four prominent factors that the Eigen values of the factors yield: the first, the second, the third, and the fourth factors, respectively. Then, the analysis of the factor loadings after the orthogonal rotation using the Varimax method is conducted. After studying the results of the retained factors, the researchers named each of

the four prominent factors, considering the details of factor loading. Each factor was named to represent the components in designomg and developomg the MALL application as an innovation and they are as follows: 1) mobile English learning resources, 2) mobile assisted language learning, 3) mobile technological functions, and 4) portal for digital collective tools. MALLO design and development consists thereafter of the four essential components in accordance with the results to RQ1.

RQ 2: The design and development of MALLO

The researchers used the questionnaire results from the EFA analysis, to design MALLO by drafting the site structure and the wireframe of the "MALLO" application. Then, the researchers design the interface to navigate through the main components including mobile English learning resources, the use of MALL, the mobile technology, and the portal for collective tools. After that, the researchers created a diagram of the systems, dividing the types of usage into three user categories: learners, teachers, and back-office administrators. The MALLO application is composed of distinctive features as displayed in Figures 2-4.

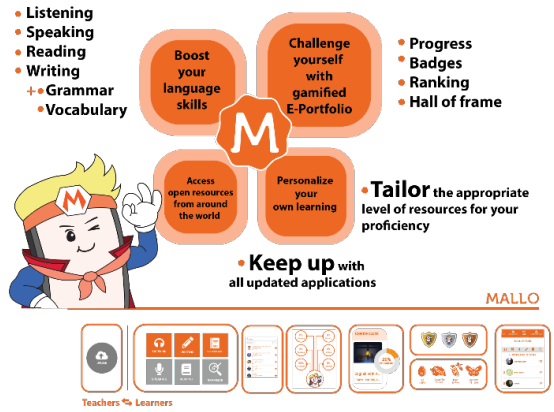

Figure 2 The distinctive features of the MALLO application

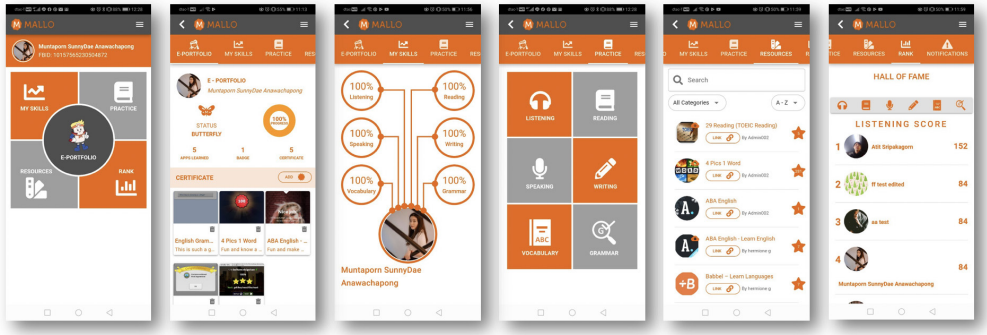

Figure 3 The main menu on the learners' MALLO application

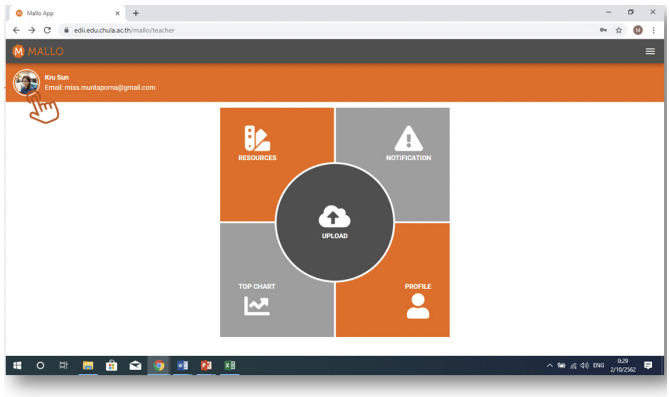

Figure 4 The main menu on the teachers' MALLO application

After the prototype of the MALLO application has been designed, then developed, the evaluation from nine experts in the fields of English language teaching and educational technology was conducted. The results are as shown in Table 5.

Table 5

The results from the nine experts' evaluations of the draft of the MALLO application

Categories of Evaluation	Average	Standard Deviation	Interpretation
Mobile English learning resources	4.60	0.24	Maximum
Mobile-assisted language learning	4.73	0.26	Maximum
Mobile technological functions	4.80	0.26	Maximum
The portal collective tools	4.89	0.18	Maximum

From Table 5, the results from the evaluation of the draft of the innovations in mobile English learning for EFL learners, the reported results of the nine experts' evaluations suggest that the portal collective tool received the highest evaluation results, with an average of 4.89 percent and a standard deviation of 0.18 percent, followed by the mobile technological functions, with an average of 4.80 percent and a standard deviation of 0.26 percent. The use of mobile-assisted language learning received an average of 4.73 percent and a standard deviation of 0.26 percent, while the English learning resource was evaluated with an average of 4.60 percent and a standard deviation of 0.24 percent.

Based on the results, the researchers then adjusted and further developed the innovations to improve the quality, resulting in the final version of the MALLO application. This new MALLO application can fully respond to the needs of learners and evolve to meet the views of the experts in all aspects. The final product design of the MALLO application is displayed in Figure 5.

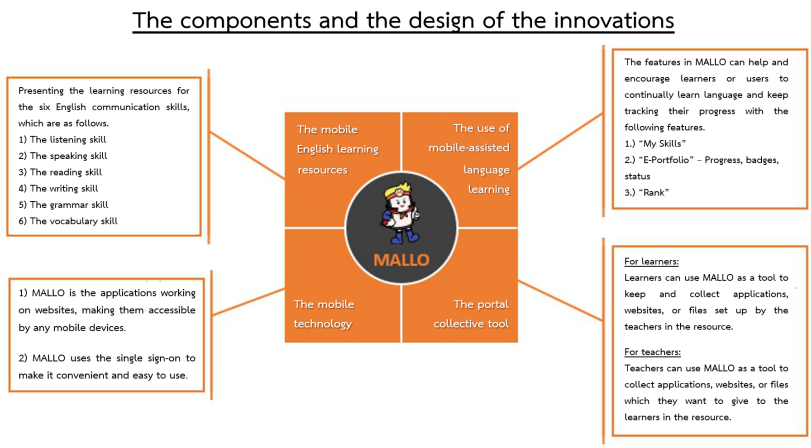

Figure 5 The main components in the final design and development of the MALLO application

The design and development of the MALLO application prototype consist of the following components.

1. The mobile English learning resources: presenting the learning resources for the six English communication skills, which are as follows.

    1) Listening skills
    2) Speaking skills
    3) Reading skills
    4) Writing skills
    5) Grammar skills
    6) Vocabulary skills

2. The use of mobile-assisted language learning: The features in MALLO can help and encourage learners or users to continually learn language and keep track of their progress with the following features.

    1) "My Skills" – For individual learners to improve the language skills they need anywhere, and at any time.
    2) "E-Portfolio" – Progress, badges, and status for the authentic self- assessment
    3) "Rank" – For learning motivation

3. The mobile technological functions

    1) MALLO is the application which also works responsively with the website format, making it more accessible from mobile devices.
    2) MALLO uses the single sign-on to make it convenient and easy to use.

4. The portal for collective tools

1) For learners: Learners can use MALLO as a tool to keep and collect applications, websites, or files based on CEFR levels suggested in the resource section.
2) For teachers: Teachers can use MALLO applications alongside with their instruction and can promote a tailor-made instruction for the learners. Teachers can also recommend the useful resources to learners to ameliorate their lack of language skills.

RQ 3: The satisfaction levels of MALLO users in Thailand

After the MALLO application was fully developed, launched to pilot, and the draft of the product was evaluated by the experts, it was made available for download on both Android and IOS systems. Then, the MALLO application prototype was launched for use to a sample group consisting of high-school students from the six regions in Thailand. The results from the satisfaction questionnaire are summarized as follows.

Table 6

Demographic data

Variable	Description	Number	Percentage
Gender	Female	213	60.2
	Male	141	39.8
Grade Level	Grade 10	135	38.1
	Grade 11	25	7.1
	Grade 12	194	54.8
School Type	Government School	170	48
	Private School	184	52
Region	North East	69	19.5
	Central	61	17.2
	West	60	16.9
	East	56	15.8
	North	54	15.3
	South	54	15.3

The questionnaires to study the satisfaction levels of learners as users of the MALLO application after experiencing the innovations in learning English were completed by 354 Thai high-school students from the six regions in Thailand. The demographic data show that there are 213 female students (60.2%), and 141 male students (39.8%). All participants involved are studying at the upper-secondary level, including 194 Grade 12 students (54.8%), followed by 135 Grade 10 students (38.1%), and 25 Grade 11 students is 25 (7.1%). A total of 184 students or 52 percent are from private schools, and the other 170 students, or 48 percent, are from public schools.

The participants are comprised of 69 students (19.5%) from the North- Eastern region, 61 students (17.2%) from the Central region, 60 students (16.9%) from the Western region, 56 students (15.8%) from the Eastern region, and 54 students (15.3%) from the Northern and Southern regions in Thailand. After the participants had experienced the use of MALLO applications, the students responded to the questionnaire to indicate their level of satisfaction. The means and the standard deviations of the overall satisfaction levels are summarized as shown in the following table.

Table 7

The summary of the satisfaction level results after using the MALLO application to learn English

Satisfaction after using the MALLO application	Mean	Standard Deviation	Interpretation
The quality of the MALLO application	4.09	0.68	High
The efficiency of the MALLO application	4.05	0.68	High
The usability of the MALLO application	4.09	0.68	High
The support for English language skills development of the MALLO application	4.15	0.69	High

According to Table 7, the satisfaction results in every aspect are at a high level. The support for English language skills shows the highest mean of 4.15, with a standard deviation of 0.69, followed by the quality and the usability, for which the means are equal at 4.09, with a standard deviation of 0.68. The last one is efficiency, which has an average of 4.05 and a standard deviation of 0.68.

RQ 4: The levels of the MALLO application evaluation

To endorse the MALLO application to be in use for English language learning, nine experts, five from the field of English language teaching and four from the field of educational technology were asked to evaluate the innovation in terms of the appropriateness of the components for English language learning, the support for English language learning, the functions, and the applications for English language learning. The results from the evaluation inventory are displayed in Table 8 below.

Table 8

The summary of the MALLO application evaluation results

MALLO Application Aspects	Mean	Standard Deviation	Interpretation
The appropriateness of the components of the MALLO application	**4.72**	**0.38**	**Very high**
1. The English learning resources	4.78	0.44	Very high
2. The use of mobile-assisted language learning	4.67	0.50	Very high
3. The mobile technological and operating functions	4.67	0.50	Very high
4. The portal collective tools	4.78	0.44	Very high

MALLO Application Aspects	Mean	Standard Deviation	Interpretation
The appropriateness of the components of the MALLO application	4.72	0.38	Very high
The appropriateness of mobile technology of the MALLO application to support English language learning for EFL learners	4.62	0.39	Very high
The appropriateness of the functions for English language learning of the MALLO application	4.50	0.45	Very high
The appropriateness of the MALLO applications regarding the real-life use for English language learning	4.44	0.45	High

Table 8 shows the results of the MALLO application evaluation from the nine experts. It was found that the appropriateness of the MALLO application's components reached the highest mean of 4.72, which is at the very high level with a standard deviation of 0.38, followed by the appropriateness of mobile technology of the MALLO application to support English language learning for EFL learners at the mean of 4.62 which is at a very high level with a standard deviation of 0.39. Next is the appropriateness of the functions for English language learning of the MALLO application at a mean of 4.50 which is at the very high level with the standard deviation of 0.46. Lastly, the results for the appropriateness of the MALLO application regarding the real-life use for English language learning reach a mean of 4.44 which is at a high level with a standard deviation of 0.45. The experts also provided some implications and suggestions concerning the MALLO application for real-life use situations; for example, the well- designed MALL innovations with access to English learning resources could lessen the teachers' burden of resource and materials preparation to a considerable extent. Moreover, learning English via mobile applications could also leverage the language learning motivation of both teachers and learners. Within the MALLO application, the researchers may highlight suggestions for interesting applications so that learners can take notice of them. The students would benefit from additional suggestions of other application they should use to learn via the MALLO application in their future language learning time.

DISCUSSION

The discussion of this study highlights the four main components of MALLO applications which are derived from the results of the EFA analysis and the satisfaction levels of 21st century learners when they use MALLO applications to learn English. The appropriate components in the design and development of the innovations are crucial. In this digital age, many language learning mobile applications can be found easily via various Internet resources. However, to determine the quality of individual applications, we need to be certain that the components or features of that application actually help promote English language learning in an effective way. Hence, the discussion will begin with the appropriate components of a MALL application as an innovation for EFL learners.

Appropriate components of a MALL application as an innovation

MALL applications for EFL learners are effective when appropriate components are well researched and explored. The mobile innovations that can promote learning and English skills should consist of the four main components: mobile English learning resources, the use of MALL, mobile technological functions, and amobile portal for collective tools. The advantages and recommendations for each of the components are discussed as follows.

1) Mobile English learning resources

The accessibility of learning resources for 21st century language learners is pivotal. Learners can get a great deal of exposure to the English language with their own choice of learning and their needs met for certain language skills improvement. When learners acquire access to various universal resources for English language learning, they can break through the constraints of the teacher as a sole provider of resources and materials for learning. Up-to-date resources can bring about meaningful learning in terms of authenticity and the linkage to the learner's real life. The mobile English learning resources can help develop all six of the English language skills in the innovations (MALLO), which are listening skills, speaking skills, reading skills, writing skills, grammar skills, and vocabulary skills. The importance of English learning resources is also suggested in the study by Duman et al. (2015). In the study, Chinese university EFL learners learn and retain more vocabulary when getting access to English learning resources than learning words on a paper-based list. In this research, MALLO applications are designed and developed for learners to gain access to websites or other applications separated by skill, which are chosen by teachers or experts to make sure they are suitable for any language anywhere at any time. The necessity of the accessibility of English language concurs with studies of Pérez-Paredes et al. (2018); Rodríguez (2018) who utilized resources from outside contexts and integrated them in the applications in order to promote learning, using the Open Educational Resources (OERs). Besides, this component is in accordance with the results of the use of mobile networks in unofficial learning for different learners and the participation in cognitive interactions, meta-cognition, and affective factors are positive (Peng et al., 2022).

2) The use of MALL

The second component, the use of MALL, is one of the crucial main components that helps motivate learners or users to learn language progressively. The design of MALLO applications enables learners to personally track their learning results. The effective features are My Skills, E-Portfolio, Progress, Badges, Status, and Rank. Gamification is also one of the design factors that help increase motivation. Badges are awarded to learners who achieve their goals set for language learning skills: listening, speaking, reading, writing, vocabulary, and grammar. These features of the second component are crucial according to García Botero et al. (2018) who mentioned tracking progression in studying so that students could direct themselves and manage how their learning should be, and record it in portfolios. Furthermore, Gafni et al. (2017) mentioned the process of gamification to encourage self-learning, utilizing badges to reward progress. These features in MALL are used so as to promote self-directed learning, in which users should be responsible for their own learning (García Botero et al., 2019).

3) The mobile technological functions

The third component is mobile technological functions. The designed technological functions of MALLO applications allow learners to use the applications on other platforms such as a website due to the responsive design. MALLO applications are flexible as they are available for download both from iOS and Android operating systems. This feature gives the learner a freedom of choice for the type of mobile device they wish to use. Furthermore, the single sign-on system is used to make the login process convenient and easy to use with learning, anywhere and at any time, efficiently and functionally. The principle of learning is in accordance with learning notions that can take place anywhere and at any time (Traxler et al., 2015), centering on providing access to the learning resources for learners (García Botero et al., 2019).

4) The mobile portal collective tools

The fourth component is the mobile portal for collective tools. MALLO applications have the component of collecting English language learning resources such as mobile applications, websites, or various folders, which are advantageous to both teachers and students. The portal feature connects the resources that can be selected using CEFR criteria. This benefits teachers to tailor personalized learning for students. The students under the guidance of language learning applications provided by the teachers can conveniently access the right or in-need resources by suggestion and add them to their learning list. The customized mobile portal tool also helps collect the updated resources. The concept is supported by Alotaibi et al. (2015) who utilized the use of web technology and API to make connections between websites, and between users and the servers, by allowing teachers to upload various types of files.

The four components are crucial in the design and development of the mobile innovations for learners of EFL. They are, thus, interconnected and complementary to each other.

Mobile-assisted language learning as a trend for educational policies in Thailand

When we explore Thailand's educational policies, English has been the foreign language in the country's focus for Thai learners for decades. Alongside the emphasis on the importance of EFL in the national education plan, technology has also been constantly promoted and the trends of both agencies are likely to grow. One of the policies is the National Education Plan 2560-2579 BE (2017-2036 AD) (Office of the Education Council, 2017), which launched the policy with guidelines on how learner-centeredness can be enhanced. The quality of learning materials such as textbooks, and various types of media should be improved, specifically being well-selected in use to effectively promote learning. In addition, to promote lifelong learning, all learners must gain access to the learning resources without time and place constraints. Digital technology and various types of social networks can be the support for a life-long learning society for people of any age.

According to Thailand's National Education Act (2542 BE or 1999 AD), all agencies in education, teachers, and learners are encouraged to possess sufficient knowledge and skills to be able to employ technology to acquire knowledge on their own for lifelong learning. For learners, that

should support independent learning. When learner-centeredness is emphasized, it results in learner autonomy and positive learning outcomes under Constructivist concepts.

To respond to the education policy, the use of MALL can converge with the teaching and learning trends. The mobile learning technology is used in language learning, enabling learners to gain access to various learning media, and can be used as a medium of communication among teachers and students from anywhere and at any time (Agnes & Shield, 2008; Kalambaeva, 2013).

The MALLO application, a MALL approach-based innovation, promotes the use of technology in English learning, making English learning flexible for the learners with its features of being accessible from anywhere and at any time, through any kind of mobile device or even website platform. After all, learners should always have alternate options to support their learning. To promote learner-centeredness, MALLO can be adjusted to fit learners' preferences and needs. However, the role of teachers should not be neglected in the learner-centered world. Teachers as facilitators for MALLO application use, can provide strong guidance to learners as MALLO users. Teachers help select English learning resources such as quality applications and websites help tailor the learning goals that suit learners with different English language abilities. MALLO also provides CEFR guidelines to justify the proficiency levels that match with English learning resources. We can conclude that MALL is suitable for and fully meets the needs of the plan's requirement in the education policy in Thailand.

CONCLUSION AND FUTURE WORK

MALL responds to new directions of English language learning in the 21st century where the learners are known as digital natives (Prensky, 2001). The effective innovations of MALL for English learners are crucial since they allow learners to carry on lifelong learning both inside and outside classrooms at their convenience. The MALLO application has the prominent components based on research results from EFA. The four major components include mobile English learning resources, the use of MALL, mobile technology, and a portal for collective tools. Due to the MALLO application's features, learners can choose to learn from up-to-date English language learning resources with the guidance of teachers and the justification with CEFR based resources to match learners' English abilities. As for MALL features, MALLO can help and encourage learners or users to continually learn language and keep track of their progress. MALLO applications use the single sign-on to make it convenient and easy to use, and they also work responsively with website formats, thus increasing accessibility to the channels with mobile devices. Lastly, MALLO as a tool that stores and collects applications, websites, or files based on CEFR levels in the resource section is very useful. For MALLO users' experiences, the satisfaction of learners as users was reported to be high while the evaluation of the innovation by the experts was within the range of high or very high in all aspects.

The limitations of the study include the timeframe for the longitudinal monitoring of the outcomes of the application's usage. The depth of insights could be further explored in future studies. Moreover, the study solely employs quantitative data analysis. Qualitative data exploring

users' experiences and viewpoints was not applied in the study, therefore, a more comprehensive understanding of the application's use for English language learning could be included in the follow-up phase of the study.

For future research that aims at designing and developing innovations for EFL learners in the field of MALL, it is recommended to explore more communication channels and promote more interaction between teachers and learners since, even though learner-centeredness is the point of emphasis, learners still need the guidance from teachers as facilitators. If the innovation provides communication platforms for both agencies, teachers, and learners, learner autonomy may be guided in an effective direction. The scope of MALLO applications focuses on language skills, but this could also be extended to other 21st century skills such as critical thinking, collaborative skills, or soft skills in the next research study. Moreover, in future studies, qualitative data could be gathered to explore users' perceptions of MALL and how these applications are used or interpreted by learners at different levels of proficiency for their own development of English skills. .

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REFERENCES

Agnes, K. H., & Shield, L. (2008). An overview of mobile assisted language learning: From content delivery to supported collaboration and interaction. *European Association for Computer Assisted Language Learning, 20*(3), 271-289. https://doi.org/10.1017/S0958344008000335

Al-Otaibi, H. M., AlAmer, R. A., & Al-Khalifa, H. S. (2016). The next generation of language labs: Can mobiles help? A case study. *Computers in Human Behavior, 59*, 342-349. https://doi.org/10.1016/j.chb.2016.02.028

Alotaibi, H. M., Alamer, R. A., & Al-Khalifa, H. S. (2015). MLab: A mobile language learning lab system for language learners. *Journal of Universal Computer Science, 21*(10), 1307-1326. https://doi.org/10.3217/jucs-021-10-1307

Arvanitis, P., & Krystalli, P. (2021). Mobile assisted language learning (MALL): Trends from 2010 to 2020 using text analysis techniques. *European Journal of Education, 4*(1), 13–22. https://doi.org/10.26417/461iaw87u

Baleghizadeh, S., & Oladrostam, E. (2011). The effect of mobile assisted language learning (MALL) on grammatical accuracy of EFL students. *MEXTESOL Journal, 34*(2), 1-10.

Council of Europe. (2011). *Common European framework of reference for languages: Learning, teaching, assessment*. Cambridge University Press.

Duman, G., Orhon, G., & Gedik, N. (2015). Research trends in mobile assisted language learning from 2000 to 2012. *ReCALL, 27*(2), 197-216. https://doi.org/10.1017/S0958344014000287

Eiammongkhonsakun, S. (2023). Investigating mobile learning applications for French and German grammar learning. *Journal of Srinakharinwirot Research and Development (Journal of Humanities and Social Sciences), 15*(29), Article 266543 (1–14). https://so04.tci-thaijo.org/index.php/swurd/article/view/266543

Elaish, M. M., Shuib, L., Ghani, N. A., Yadegaridehkordi, E., & Alaa, M. (2017). Mobile learning for English language acquisition: Taxonomy, challenges, and recommendations. *IEEE Access, 5*, 19033-19047. https://doi.org/10.1109/ACCESS.2017.2749541

Gafni, R., Achituv, D. B., & Rachmani, G. J. (2017). Learning foreign languages using mobile applications. *Journal of Information Technology Education: Research, 16*, 301-317.

García Botero, G., Questier, F., Cincinnato, S., He, T., & Zhu, C. (2018). Acceptance and usage of mobile assisted language learning by higher education students. *Journal of Computing in Higher Education, 30*(3), 426-451. https://doi.org/10.1007/s12528-018-9177-1

García Botero, G., Questier, F., & Zhu, C. (2019). Self-directed language learning in a mobile-assisted, out-of-class context: Do students walk the talk? *Computer Assisted Language Learning, 32*(1-2), 71-97. https://doi.org/10.1080/09588221.2018.1485707

Gillespie, J. (2020). CALL research: Where are we now? *ReCALL, 32*(2), 127-144. https://doi.org/10.1017/S0958344020000051

Hashim, H., Yunus, M. M., Embi, M. A., & Ozir, N. A. M. (2017). Mobile-assisted language learning (MALL) for ESL learners: A review of affordances and constraints. *Sains Humanika, 9*(1-5), 45-50.

Kalambaeva, G. (2013). *Mobile assisted language learning*. http://www.confcontact.com/20130220/2013_02_langue.pdf#page=5

Klopfer, E., Squire, K., & Jenkins, H. (2002, August 30). *Environmental detectives: PDAs as a window into a virtual simulated world* [Paper presentation]. IEEE International Workshop on Wireless and Mobile Technologies in Education, Tokushima, Japan. https://doi.org/10.1109/WMTE.2002.1039227

Lilley, W., & Hardman, J. (2017). "You focus, I'm talking": A CHAT analysis of mobile dictionary use in an advanced EFL class. *Africa Education Review, 14*(1), 120-138. https://doi.org/10.1080/18146627.2016.1224592

Liu, G. Z., Lu, H. C., & Lai, C. T. (2016). Towards the construction of a field: The developments and implications of mobile assisted language learning (MALL). *Digital Scholarship in the Humanities, 31*(1), 164-180. https://doi.org/10.1093/llc/fqu070

Nuraeni, C., Carolina, I., Supriyatna, A., Widiati, W., & Bahri, S. (2020, November). Mobile-assisted language learning (MALL): Students' perception and problems towards mobile learning in English language. *Journal of Physics: Conference Series, 1641*(1), 012027. https://doi.org/10.1088/1742-6596/1641/1/012027

Office of the Education Council. (2017). *Education in Thailand*. Prigwan Graphic.

Ozer, O., & Kılıç, F. (2018). The effect of mobile-assisted language learning environment on EFL students' academic achievement, cognitive load and acceptance of mobile learning tools. *Eurasia Journal of Mathematics, Science and Technology Education, 14*(7), 2915-2928. https://doi.org/10.29333/ejmste/90992

Palomo-Duarte, M., Berns, A., Isla-Montes, J. L., Dodero, J. M., & Kabtoul, O. (2016, November). *A collaborative mobile learning system to facilitate foreign language learning and assessment processes* [Paper presentation]. The Fourth International Conference on Technological Ecosystems for Enhancing Multiculturality, Salamanca, Spain.

Peng, H., Jager, S., & Lowie, W. (2021). Narrative review and meta-analysis of MALL research on L2 skills. *ReCALL, 33*(3), 278-295. https://doi.org/10.1017/S0958344020000221

Peng, H., Jager, S., & Lowie, W. (2022). A person-centred approach to L2 learners' informal mobile language learning. *Computer Assisted Language Learning, 35*(9), 2148-2169. https://doi.org/10.1080/09588221.2020.1868532

Pérez-Paredes, P., Ordoñana Guillamón, C., & Aguado Jiménez, P. (2018). Language teachers' perceptions on the use of OER language processing technologies in MALL. *Computer Assisted Language Learning, 31*(5-6), 522-545. https://doi.org/10.1080/09588221.2017.1418754

Prensky, M. (2001). Digital natives, digital immigrants part 2: Do they really think differently? *On the Horizon, 9*(6), 1-6. https://doi.org/10.1108/10748120110424843

Rodríguez, J. C. (2018). Redesigning technology integration into world language education. *Foreign Language Annals, 51*(1), 233-239. https://doi.org/10.1111/flan.12328

Shadiev, R., Yang, M. K., Reynolds, B. L., & Hwang, W. Y. (2022). Improving English as a foreign language–learning performance using mobile devices in unfamiliar environments. *Computer Assisted Language Learning, 35*(9), 2170-2200. https://doi.org/10.1080/09588221.2020.1868533

Shanmugapriya, A., & Tamilarasi, A. (2013). Design and development of mobile assisted language learning (MALL) application for English language using Android push notification services. *International Journal of Research in Computer and Communication Technology, 2*(6), 329-337.

Sofwan, A., Al-Qarni, N. M., & Yusof, N. A. (2021). A systematic review of mobile learning adoption in higher education. *International Journal of Emerging Technologies in Learning (iJET), 16*(5), 147-165. https://doi.org/10.3991/ijet.v16i05.12647

Soleimani, E., Ismail, K., & Mustaffa, R. (2014). The acceptance of mobile assisted language learning (MALL) among post graduate ESL students in UKM. *Procedia-Social and Behavioral Sciences, 118*(2014), 457-462. https://doi.org/10.1016/j.sbspro.2014.02.062

Srithongkul, W. (2019). Developing listening-speaking skills in English for communication subject of students at Dhonburi Rajabhat University Samutprakarn through echo English application. *Academic Journal for the Humanities and Social Sciences, 2*(3), 23-42.

Stockwell, G., & Hubbard, P. (2013). *Some emerging principles for mobile-assisted language learning*. The International Research Foundation for English Language Education. http://www.tirfonline.org/english-in-the-workforce/mobile-assisted-language-learning

Sung, Y. T., Chang, K. E., & Yang, J. M. (2015). How effective are mobile devices for language learning? A meta-analysis. *Educational Research Review, 16*(2015), 68-84. https://doi.org/10.1016/j.edurev.2015.09.001

Traxler, J. (2013). *Mobile learning for languages: Can the past speak to the future?* The International Research Foundation for English Language Education. https://www.tirfonline.org/wp-content/uploads/2013/11/TIRF_MALL_Papers_Traxler.pdf

Traxler, J., Barcena, E., & Laborda, J. G. (2015). Mobile technology for foreign language teaching: Building bridges between non-formal and formal scenarios. *Journal of Universal Computer Science, 21*(10), 1234-1247.

Turc, L. (2017). *Mobile-assisted language learning (MALL)*. RATE Issues. https://rate.org.ro/blog2.php/1/mobile-assisted-language-learning-mall

Viberg, O., & Grönlund, Å. (2017). Understanding students' learning practices: Challenges for design and integration of mobile technology into distance education. *Learning, Media and Technology, 42*(3), 357-377. https://doi.org/10.1080/17439884.2016.1088869

Watkins, M. W. (2018). Exploratory factor analysis: A guide to best practice. *Journal of Black Psychology, 44*(3), 219–246. https://doi.org/10.1177/0095798418771807

Watson, H., & White, G. (2006). *mLearning in education: A summary*. Education.au limited.

Williams, B., Onsman, A., & Brown, T. (2010). Exploratory factor analysis: A five-step guide for novices. *Australasian Journal of Paramedicine, 8*, 1-13.

Yaman, I. (2016). *Current trends in ELT*. Nüans Kitabevi.

Yamane, Taro. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper and Row.

Yükselir, C. (2017). A meta-synthesis of qualitative research about mobile assisted language learning (MALL) in foreign language teaching. *Arab World English Journal (AWEJ), 8*(3), 302-318. https://dx.doi.org/10.24093/awej/vol8no3.20

Appendix

The researchers' names the four components which can be clearly analyzed from EFA results, with the use the factor loading of the overall texts included in the components. The variances are displayed as follows.

Table 9

Variances of the four components of the MALLO application

Variances	Factor Loading
The first component has 40 sub- items with the factor loading between 0.42 and 0.72, and the Eigen value of 50.10. This component is named "**the mobile English learning resource**".	
42 Using blogs in mobile English learning	0.52
43 Using podcasts in mobile English learning	0.56
48 Using portfolios in the evaluation of mobile English learning	0.50
49 Tracking progression in English learning through mobile networks	0.51
50 Doing challenging activities during the evaluation through mobile networks	0.50
51 Evaluating English writing, using social networks through mobile networks	0.52
52 Learning English listening through mobile networks by listening to recorders	0.52
53 Learning English listening through mobile networks by listening to news from applications	0.52
55 Learning English listening through mobile networks by means of scenarios	0.45
56 Learning English speaking through mobile networks, using dictionaries in teaching communication	0.42
57 Learning English speaking through mobile networks, using learners' recorders	0.61
58 Learning English speaking through mobile networks, using Videos for Speaking (VISP)	0.62
59 Learning English speaking through mobile networks, using Social Networking Sites (SNSs)	0.53
61 Learning English speaking through mobile networks, using Text to Speech	0.61
62 Learning English speaking through mobile networks, using Voice-operated	0.66
63 Learning English speaking through mobile networks, using conversation in interactive mode	0.64
64 Learning English reading through mobile devices	0.55
66 Learning English reading through mobile networks by means of reading dialogues in mobile devices to learn vocabulary, phrases, and sentence structures	0.50
67 Learning English reading through mobile networks, using ChatBot	0.65
68 Learning English reading through mobile networks, using short voice messages	0.58
69 Learning English reading through mobile networks, using hyperlinks to get to other webpages	0.71
70 Learning English reading through mobile networks, using selective reading	0.69
71 Learning English writing through mobile networks, using SMS	0.67
72 Learning English writing through mobile networks by practicing writing in applications	0.62
73 Learning English writing through mobile networks, using social networks	0.49

Variances	Factor Loading
74 Learning English vocabulary through mobile networks, using SMS/MMS	0.69
75 Learning English vocabulary through mobile networks, using e-books	0.65
76 Learning English vocabulary through mobile networks, using voice buttons in applications	0.62
77 Memorizing English vocabulary through mobile networks by means of reviewing on applications	0.58
78 Learning English vocabulary through mobile networks, using keywords on websites containing videos	0.58
79 Learning English vocabulary through mobile networks, using multimedia to build learning retention	0.47
80 Learning English grammar through mobile networks, using social networks	0.53
81 Learning English grammar through mobile networks, using translation aids	0.47
82 Learning English grammar through mobile networks by means of doing exercises on applications	0.57
83 Learning English grammar through mobile networks, using SMS	0.70
84 Learning English grammar through mobile networks, using hyperlinks to get to other webpages	0.72
85 Communicating with others using English on mobile networks	0.51
86 Sharing English learning information with others through mobile networks	0.52
87 Communicating with teachers or experts by sending messages through mobile networks	0.55
89 Working with others while learning English through mobile networks	0.53
Eigen Value	**50.10**
Percentage of Deviation	**56.29**
The second component has 23 variables with the factor loading between 0.40 and 0.74, and the Eigen value of 3.36. This component is named "**the use of mobile-assisted language learning**".	
1. Using mobile networks to learn English by one's own on applications	0.65
2 Using mobile networks to learn English and modify the learning to fit one's learning preference	0.74
3 Using mobile networks to learn English from anywhere and at any time	0.70
4 Using networks to generate motivations in learning English	0.74
5 Using mobile networks to design how one should study and direct oneself when learning English	0.67
6 Using mobile networks to facilitate learning English	0.71
7 Using mobile networks to study on one's own on one's mobile devices	0.68
8 Using mobile networks to entertain oneself while learning English	0.72
9 Using mobile networks to create opportunity for learning English	0.74
10 Using mobile networks to motivate oneself to learn English	0.71
11 Using mobile networks to learn English according to one's interest	0.70
12 Using mobile networks as mobile language lab systems	0.57

Variances	Factor Loading
13 Using mobile networks to encourage participation in learning	0.53
14 Using mobile networks to create challenges while learning English	0.53
15 Using mobile networks to record progression in learning	0.51
17 Using smart phones as English learning devices	0.58
21 Logging in to mobile networks through iOS and Android operating systems	0.57
24 Using Wi-Fi networks to access data	0.50
26 Using information from the outside to integrate with those in the English learning applications through available networks	0.47
27 Using Social Network Sites (SNSs) on mobile networks	0.44
41 Using captions while learning English through mobile networks	0.45
44 Using social networks while learning English through mobile networks	0.40
65 Learning English reading, using mobile tools which are suitable for translation, pronunciation, and explanation of vocabulary, sentences, paragraphs, and various articles	0.43
Eigen Value	**3.36**
Percentage of Deviation	**3.77**
The third component has 17 variables with the factor loading between 0.39 and 0.56, and the Eigen value of 1.77. This component is named "**the mobile technology**".	
16 Creating an avatar in a virtual world on mobile networks	0.56
18 Using Tablet PC devices as a tool in learning English	0.52
19 Using portable computers as a tool in learning English	0.54
20 Using other digital devices such as iPod, MP3 or MP4 players as a tool in learning English	0.55
22 Logging in to mobile networks on portals	0.55
23 Using authentications on mobile networks with Single Sign-On	0.50
25 Using virtual assistant technology, such as Siri or Voice Recognition technologies while learning English on mobile networks	0.53
28 Separating applications for teachers from those for learners on mobile networks	0.45
29 Creating learners' online identities on mobile networks	0.53
30 Using chat boxes when learning English on mobile networks	0.44
31 Getting immediate evaluation results when learning English on mobile networks	0.42
32 Using instant messenger applications such as WhatsApp and Line when learning English on mobile networks	0.39
33 Building an English learning community through mobile networks	0.47
34 Using Open Educational Resources (OERs) when learning English on mobile networks	0.50
45 Learning English on one's own, using only mobile networks	0.51

Variances	**Factor Loading**
46 Using mobile networks as a tool in learning English in classrooms	0.43
47 Integrating English learning in classrooms with the use of mobile networks	0.39
Eigen Value	**1.77**
Percentage of Deviation	**1.99**
The fourth component has 6 variables with the factor loading between 0.48 and 0.65, and the Eigen value of 1.39. This component is thus named "**the portal collective tool**".	
35 Uploading various document files used in learning English on mobile networks	0.59
36 Uploading or deleting data about images, photos, and graphics used in learning English on mobile networks	0.62
37 Uploading or deleting video files used in learning English on mobile networks	0.65
38 Uploading or deleting audio files used in learning English on mobile networks	0.65
39 Uploading or deleting text files used in learning English on mobile networks	0.62
40 Doing exercises and practicing learning English on mobile networks	0.48
Eigen Value	**1.39**
Percentage of Deviation	**1.57**