

Mobile-Assisted Language Learning using Task-Based Approach and Gamification for Enhancing Writing Skills in EFL Students

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Abstract: The purposes of this research were 1) to study the user experience and needs of EFL students and teachers in learning English writing skills; 2) to design and develop a mobile-assisted language learning (MALL) application, teaching writing procedure, and writing activities; and 3) to implement a MALL application and, teaching writing procedure to students. The samples were 665 EFL lower secondary students in Thailand as the online survey respondents and five high school teachers as the interviewees. The experiment samples were 35 EFL lower secondary students. The research instruments consist of the MALL application, the learning process, English writing tasks, English writing tests, scoring writing rubrics, and a questionnaire on student satisfaction. The experimental period lasted for 8 weeks. The data were analysed by using frequency, mean, standard deviation, priority needs index, dependent t-test, and one-way ANOVA with repeated measure analysis. The research result indicated that 1) lower secondary students were able to use the internet on a regular basis. Students wanted to learn writing skills relevant to the student's experience through the study of writing errors, writing samples, writing styles, peer assessment, and constructive feedback from teachers. 2) The learning process of mobile-assisted language learning application using a task-based approach and gamification to enhance lower secondary students' English writing skills consisted of 3 components: pre-task, task process, and language focus. The 7 steps are as follows: selecting themes, exploring topics, drafting ideas, editing tasks, giving feedback, reviewing submissions, and concluding findings. 3) The experiment results indicated that the samples' English writing skills in the post-test were higher than in the pre-test at the .05 level of significance. 4) The difference in mean scores in the English writing tasks showed that there was a difference between English writing scores at the .05 level of significance ($F=1579.266$, $\text{sig}=.000$). 5) The result of satisfaction showed that the respondents were very satisfied with the learning process and MALL application.

Keywords: MALL Application, Task-Based Approach, Gamification, English Writing Skills

1. Introduction

The rapid changes of globalization in the 21st century and outbreak of the COVID-19 pandemic significantly affect every industrial sector to the new normal changes. Digital devices, especially mobile devices, have become more important for educational purposes to learn and seek in digital verse for learners (Papadakis and Kalogiannakis, 2017). Moreover, information and communications technology (ICT) and mobile learning have played important roles in language teaching and learning. They extend the opportunities to design various language teaching methods and promote learners' motivation and meaningful language learning experiences (Finardi, Leão and Amorim, 2016; Shi, Luo and He, 2017; Yundayani, Kardijan and Herawan, 2019). Then, learning resources can be accessed anywhere and anytime via mobile applications (Miao, et al. 2017). The Mobile-assisted language learning (MALL) application has also provided learners with spontaneous access, convenience, collaboration, and different learning contexts (Kukulska-Hulme and Shield, 2008; Mosavi Miangah and Nezarat, 2012). Some examples of MALL applications, both native and web applications, for mobile platforms are Duolingo, Memrise, and MALLO. They are used for facilitate English as a Foreign Language (EFL) students to learn English language inside and outside the classroom. (Lindaman and Nolan, 2015).

A survey of English Proficiency Index (EPI) assessment among students in 100 countries from the Education First Institute (EF) shows that Thai students were ranked 89th out of 100 consecutively in the Very Low Proficiency level during 2011 to 2020. (Education First, 2020). Even though English has been taught to Thai students for a long time. However, Thai learners of English still cannot write properly. One of the possible causes of the issue may be inappropriate teaching techniques. Due to instructors' continued adherence to a teaching-learning method that is instructor-centered, unable to integrated educational technology in classroom, and emphasizes

lecturing, learners lack involvement or instructional activities and are unable to use classroom knowledge in their everyday lives (Chaturanon, et al., 2015).

Then, to design the meaningful English writing learning applications and learning process to EFL learner, it is a complex process due language barrier, such as culture, interest, motivation, and other internal and external factors (Kharis, et al., 2020). Especially, writing skills is very challenging for EFL students to decode their native language and encode into the written comprehensible English language. To enhance writing skills, the task-based approach (TBA) can enable students to practice the English language skill via real-world and relevant tasks to enhance their writing skills (Yundayani, Kardijan and Herawan, 2019). Besides, gamification can be used in instruction and language learning environment to bolster learners' motivation and thinking which creates a competitive environment (Bicen and Kocakoyun, 2018). Gamification uses game elements, such as levels, points, and rewards, in non-game contexts (Kapp, 2012). Gamification can also increase students' interests and motivation while learning and accepting e-learning and m-learning contents (Ozcinar, et al., 2019; Yamani, 2021).

The present study therefore focuses on the development and implementation the MALL Application for lower secondary EFL students in Thai context. The purpose of this research is to investigate EFL students' and teachers' experiences and need in teaching and acquiring English writing skills. Then, design and develop a MALL Application that is applicable to learners on multiple platforms and can assist EFL students with their writing skills based on their individual needs and experiences. This app, which combines MALL, TBA, and gamification, will ease the EFL learning process and improve EFL learners' English writing abilities.

2. Purpose of the research and research questions

The present study is design-based research that attempts to design a learning prototype of mobile application, writing learning process, and learning activities that can be used either for hybrid or remote learning. This study not only aims to describe the designed mobile application and writing learning process but also examines the usefulness and useability of processes and the design principles before the real-world implementation. Hence, research questions can be stated as follows:

RQ1: What are the user experiences and needs for teaching and learning English writing skills?

RQ2: What are the design principles and elements based on the user experience and needs for designing and developing a mobile application, writing learning process, and learning activities for improving EFL writing skills?

RQ3: Can the mobile application and writing learning process support student to enhance their English writing skills?

According to the research questions, this aims study were to:

1. Study the user experience and needs of EFL students and teachers in learning English writing skills
2. Design and develop a mobile application, writing learning process, and learning activities
3. Implement the mobile application and writing learning process for students

3. Literature Review

3.1 Mobile-Assisted Language Learning

Mobile-assisted language learning (MALL) is the subset of Mobile learning (M-learning) and computer-assisted language learning (CALL) (Kim, 2012; Uwizeyimana, 2018). For MALL, mobile devices are used with support of the Internet network, Wi-Fi, 3G, 4G, or 5G to access learning anywhere and anytime, and learners are responsive to mobile display screens. The characteristics of MALL are time and space flexibility, portability, personalization, and interactivity (Persson and Nouri, 2018; Şad, et al., 2020). In education, MALL can be in forms of social networking websites and mobile applications (e.g., Facebook, Twitter, and YouTube); podcasts (e.g., Apple Podcast, Soundcloud, and Spotify); learning management systems (LMS) (e.g., Moodle, Schoology, Google Classroom, and Blackboard); and automatic speech recognitions (ASR) or voice recognition software (e.g., Siri, Google Assistant, and Alexa).

3.1.1 MALL and language teaching method

In addition, MALL offers students access to learning materials outside the classroom and various learning contexts (Shi, Luo and He, 2017). To effectively design a MALL application, educational uses of mobile technology must be included along with pedagogy that suits the learners' context. (Papadakis, 2021). Task-based approach

(TBA) is one of the strategies that may be utilized to improve writing abilities and English fluency (Xue, 2020). Moreover, on mobile devices, learners can learn through their learning styles based on their needs. They can also share information with other learners and teachers using mobile or web applications, contributing to collaboration between peers and teachers with digital experiences (Persson and Nouri, 2018, Papadakis, 2021). Moreover, Koraneekij and Khlaisang (2015) stated that there are four elements for designing of digital learning experience namely electronic content, learning management system, communication, and evaluation. All features emphasize a technique of instruction in which students have a more active role as learners in the learning process.

3.2 Task-Based Approach

Task-based approach (TBA) or task-based language learning (TBLL) is a subset of communicative language teaching (CLT) methods (Aliasin, et al., 2019). TBA activates learners' cognitive process by practicing the target language via meaningful and communicative language tasks, which indirectly enhance students' self-confidence and motivation (Ellis, 2003; Yundayani, Kardijan and Herawan, 2019). In TBA, Learners are provided a task to practice the target language while communicating. Learning English language is more than just commit structure, rules, phonology, and lexical terms. The language task should boost students' self-esteem and, as a result, keep them interested. Instructors have a critical role in selecting appropriate tasks that allow pupils to interact socially and develop mutual respect (Yundayani, Kardijan and Herawan, 2019). Then, Nunan (2004) stated the principles and procedures of TBA are as follows:

- Content selection depending on learner's needs.
- Concentrate on learning to communicate in the target language via interaction activities.
- Emphasis on both language and the learning process and personalize experiences are being added to instructions.
- Correlate between classroom language learning and real-life language use.
- Concern with the needs of students, their communicative and applied language abilities, as well as real and meaningful activities.

3.3 Gamification

In the educational context, gamification stimulates learning motivation and engagement with game elements, such as points, badges, rewards, and achievements (Kalogiannakis, Papadakis and Zourmpakis, 2021; Zourmpakis, Papadakis and Kalogiannakis, 2022). Dynamics, mechanics, and appropriate components are merged into learning to result in expected learning outcomes, including positive behaviour and increased learner motivation while learning (Bicen and Kocakoyun, 2018; Kapp, 2012). According to (Kalogiannakis, Papadakis and Zourmpakis, (2021), adopting gamification in the learning process may promote motivation and engagement, learning successes, and social interaction. Furthermore, gamification helps with learners' language skills, (Yavuz, Özdemir and Celik., 2020, Kayımbaşioğlu, Oktekin and Hacı, 2016), attitudes toward the English language (Phuong, 2020), motivation, and confidence (Zou, 2020).

3.3.1 Gamification in e-learning

To take advantage of gamification for implement in digital platform, Phuong (2020) has suggested that, to design gamification for e-learning, the main concept should emphasize goal-based activities, reward mechanisms, and progress tracking. Furthermore, Kapp (2012) using points and badges alone does not result in a completed gamification application, and game designers must design the game elements according to the main objectives and consider how the players' behaviour will change and their motivation while learning will increase.

3.4 English Writing Skills

The four language skills consist of listening, speaking, reading, and writing, with writing being the most difficult and requiring the most complicated language processing. Multiple areas of knowledge, such as vocabulary, grammar, and experiences, are considered for the success of writing skills and the construction of communicative language using encoded letters and structures (Mohamad, Ghazali and Hashim, 2018, Gabrielatos, 2002, Kharis, et al., 2020).

3.4.1 Designing teaching English Writing

To design teaching writing, Gabrielatos (2002) has proposed the framework for teaching writing, which involves four stages: awareness-raising, support, practice, and feedback. First, the awareness-raising stage explores ideas and identifies examples of writing and features from various text types that arise when learners become familiar

with the task (Kumar and Mohite, 2017; Williams, 2014). Second, in the support stage, the facilitator helps learners by guiding and clarifying writing topics as well as providing writing examples and guidelines for appropriate organization, layouts, and styles. Additionally, the teacher presents relevant vocabulary, grammar, and background information in a pre-writing activity. Third, in the following stage, students translate the information from previous pre-writing activities into English (Sasaki, 2000) in both controlled and free practice. Finally, in the feedback stage, the teacher and peers give comments and grades. This stage provides constructive feedback, gives discussions for writing improvement, and identifies strong and weak points of the learners' writing tasks.

Therefore, to improve the writing skills of young students, learning designers must construct the whole teaching process to be relevant to real-world tasks, scaffold activities with learners' prior background knowledge, and encourage students to detect writing patterns and language.

4. Research methodology and design

The research was divided into three phases based on the research questions.

Phase 1: This study adopted the mixed-method research design using a qualitative dataset with a secondary quantitative dataset. The quantitative data were collected using the online questionnaire, and the qualitative data were collected via semi-structured interviews. The 665 EFL lower secondary students in four regions, north-eastern, northern, central, and southern Thailand completed the online survey. The simple random sampling method was used to draw the samples for this study (see **Error! Reference source not found.**). The semi-structured interviews were conducted with five Thai teachers as the samples who have been teaching English writing to secondary students in Thai secondary schools.

The survey questionnaire was divided into three parts. Part 1 involved the demographic data of the sample including gender, educational levels, regions, and GPAX. Part 2 was related to learners' use and access of the Internet in their daily lives. Part 3 was about the user experience and needs for improving writing skills, use of gamification in English writing tasks, as well as challenges in games, rewards, and English writing learning.

The index of Item Objective Congruence (IOC) was used to evaluate the content validity of the questionnaire. The scores given by three experts were calculated to find the consistency index between items and their objectives. If the score was higher than or equal to 0.5, the item was considered appropriate. As a result, it was found that all items were appropriate. However, one of the experts suggested that another open-ended question on the opinions toward the English writing tasks should be added to the questionnaire. Therefore, the questionnaire was revised accordingly. Then, the survey was piloted with 30 lower secondary students. Using Cronbach's alpha or coefficient alpha, the results confirmed that the questionnaire exhibited high reliability, with a coefficient alpha of 0.872, exceeding or approaching the acceptable level of 0.70. The survey questionnaires were created with a web application as the online survey, making the survey form responsive to the screens of different computers and mobile devices. The data was collected for two months.

The semi-structured interviews topics are divided into three questions: the current content and method of English writing tasks, the teacher characteristics, and styles of teaching English writing in classroom, and the assessment method and techniques for English writing.

Table 1: Sample sizes in different regions in Thailand

Regions in Thailand	n	%
North-eastern region	148	22.26%
Northern region	100	15.04%
Central region	256	38.50%
Southern region	161	24.21%
Total	665	100%

The phase of study used content analysis method for the interview data analysis, descriptive statistics for the survey and interventions evaluation; including means, standard deviations, frequencies, and percentages, and priority needs index (PNI_{Modified}) (Wongwanich, 2015) calculation in the importance (I) and degree of success (D) for assessing and prioritizing the learners' needs in the first phase. The degree of success was achieved by comparing the current states and the expected states when importance was defined as needs prioritization (Koraneekij and Khlaisang, 2019).

$$PNI_{\text{Modified}} = \frac{(I - D)}{D}$$

Phase 2: We utilized the data from RQ1 together with the literature studies to generate the design principles for developing and designing the intervention. Then, we determined the initial design principles for designing and developing the mobile application for enhancing writing abilities based on a task-based approach and gamification to suit the needs of the users. The writers used data from phase 1 combined with literature studies and principles. The researchers then designed and developed the mobile application for improving writing abilities utilizing a task-based strategy and gamification. For pilot-testing and validating the interventions, five experts in the disciplines of mobile learning, gamification, and TBA in Thailand were purposefully selected to validate and endorse the interventions and to provide some recommendations. This is done through semi-structured interviews and the evaluating questionnaires (5-point Likert scale). The questionnaires consisted of overall characteristics of the interventions, design arguments, design principles, and components of the MALL application and writing learning process and activities. Afterward, the researchers used data that was collected from the experts and iterate the interventions.

Phase 3: The researchers used the interventions with 35 EFL lower secondary students from a private high school in Bangkok, Thailand. The research instruments consisted of the MALL application, the learning process, English writing tasks, English writing tests, scoring writing rubrics, and a questionnaire on student satisfaction. The study implemented the pre-experimental design method in the one-group pre-test and post-test time-series design method. This experiment took eight weeks (two hours per week) during semester 1 in 2022. The research instruments consisted of the MALL application, the learning process, six English writing tasks, two English writing tests, a writing score analytic rubric (total of 25 points including grammar, organization, mechanics, content, and vocabulary assessments), and a questionnaire on student satisfaction (5-point Likert scale).

The students were required to take the pre-test and post-test to measure their level of English writing skills. Moreover, the student had to complete the six English writing tasks during the eight weeks of the experiment. Afterward, students completed the questionnaire on student satisfaction. For the process of creating the tests and tasks, this research relied on three experts who are English language teachers. These experts were required to validate the content IOC at the average values of 0.868 for the tests and tasks and 0.812 for the questionnaire. The experimental data were analysed by using frequency, mean, standard deviation, dependent t-test, and one-way ANOVA with repeated measure analysis for measuring English writing skills in weeks 1, 3, 5, and 7 (Table 2).

Table 2: Pre-experimental designs method in this research

Sample	Pre-test (week 1)	Interventions	Evaluation No.1 (week 3)	Evaluation No.2 (week 5)	Evaluation No.3 (week 7)	Post-Test (week 8)
E	O ₁	X	O ₂	O ₃	O ₄	O ₅

X = Treatment of MALL application, writing learning process, English writing tasks

E = Experimental group

O₁ = Pre-test

O₂ = Writing evaluation No.1

O₃ = Writing evaluation No.2

O₄ = Writing evaluation No.3

O₅ = Post-test

The researchers followed the privacy, data protection, and confidentiality policy. Therefore, all research participants' identities and data remained unidentifiable and will be deleted immediately after the research is completed. The participants from both cohorts gave us consent to use their data for research purposes.

5. Result and Findings

5.1 User's data and interviews data

Survey respondents were 665 English language learners in lower secondary (Grade 7 to 9) all over Thailand. 310 (46.6%) were males, and 355 (53.4%) were female. Respondents were in different regions in Thailand: 256 (38.50%) in central Thailand, 148 (22.26%) in north-eastern Thailand, 100 (15.04%) in northern Thailand, and 161 (24.21%) in southern Thailand. The analysis of students' GPAX showed that the average of Grade 7 students was 3.50 (SD=0.49, MAX=4.00, MIN=1.84), the average of Grade 8 students was 3.39 (SD=0.54, MAX=4.00, MIN=1.80), and the average of Grade 9 students was 3.39 (SD=0.51, MAX=4.00, MIN=2.08).

The Internet usage behaviour showed that students used the Internet for various purposes, such as communication (f=514, 77.29%), downloading/uploading data (f=363, 54.59%), entertainment (f=573, 86.17%), information search (f=512, 76.99%), gaming (f=197, 29.62%), and education and learning (f=520, 78.20%). The students used the Internet 4-7 hours per day (f=268, 40.3%) during 18:01 – 22:00 (f=325, 48.9%). Most of them accessed the Internet from their house (f=627, 94.3%) via Android (f=473, 71.1%) smartphones (f=549, 82.6%).

Results indicated that learners thought that the three tasks that had improved their writing skills the most were designing a portfolio (f=137, 20.6%), describing a picture (f=135, 20.3%), and writing an essay (f=125, 18.8%). Furthermore, learners stated that competing with classmates (f=158, 23.8%), opportunity to develop themselves (f=136, 20.5%) and gathering rewards (f=111, 16.7%) could be the challenge that motivated them to do tasks and learn. Rewards (f=436, 65.56%), items (f=332, 49.92%), and points (f=379, 56.99%) were what students expected to get from game activities. Results also suggested that handing in the assignment on time (f=261, 39.50%), the number of completed tasks (f=229, 34.44%), and the interaction/participation with learners (f=206, 30.98%) should be rewarded.

The results from the questionnaire on the needs for practicing English writing indicated that the focus should be on (1) studying writing errors from examples (PNI_{Modified}=0.27), (2) brainstorming and exchanging writing ideas (PNI_{Modified}=0.26), and (3) studying examples of good writing (PNI_{Modified}=0.25). Moreover, the evaluation of students' writing should include (1) peer-rating (PNI_{Modified}=0.30), (2) voting (PNI_{Modified}=0.28), and automated writing scoring (PNI_{Modified}=0.27). In addition, the evaluation should be done by (1) learners from different classes (PNI_{Modified}=0.37), the public (PNI_{Modified}=0.36), and English teachers in the school (PNI_{Modified}=0.32).

The last item in the questionnaire was an open-ended question. The students were asked to give suggestions for developing the application. They suggested that:

- the writing tasks should be relevant and authentic.
- teachers should provide something that motivates students to write.
- tasks should be of different difficulty levels for learners to practice writing.
- the criteria should be designed to reflect different levels of proficiency.

According to the interview data, the teaching of English writing could be divided into three topics: the content of writing tasks, the characteristics of teaching English writing, and the assessment method. The results of the analysis are as follows:

- **Content of writing tasks:** Lower secondary pupils may be unfamiliar with formal and informal writing structures and vocabulary. These may vary from how they write in Thai, their native language. In addition, instructors should give students with feedback and direction to help them comprehend the overall quality of their writing and make adjustments. In addition, writing assignments should be authentic and relevant to students' everyday lives so that they are motivated and able to apply what they have learned in the real world.
- **Characteristics of English writing instruction:** To enhance writing abilities, students must constantly practice writing in English and use vocabulary and grammar. Before beginning to write, the instructor should familiarize students with writing issues and relevant language. In this procedure, a brainstorming session might be held. Then, the instructor may show students several writing styles or writing examples so that they could become familiar with writing patterns and forms.
- **Assessment method:** The evaluation of writing may involve both peer and instructor judgments. Teachers may allow students to examine each other's writing to assist learners to identify mistakes and

potential for advancement. Then, teachers might evaluate student work based on the criteria set cooperatively by the teacher and the students. Instructors might offer students with feedback in a variety of methods, including pointing out faults and discussing them with students.

5.2 Design and development of interventions

5.2.1 The initial design principles

From the user data and interview data, they could be grouped into four aspects: Internet usage, English writing tasks, English writing teaching, and gamification design before construct the design principles to meet the users experience and needs.

- **Internet usage:** Most students could access the Internet via their Android smartphones. Thus, a lightweight MALL application would be appropriate since it could be accessed through web browsers on their smartphones.
- **English writing tasks:** In order to familiarize students with English writing tasks, the tasks should be guided writing tasks are relevant to students' experience, such as self-introduction, an essay on daily life and describing pictures. Then, the teacher should provide ideas, guidelines, and additional resources for students to complete writing tasks.
- **English writing teaching:** English writing teaching should consist of studying errors in writing samples, brainstorming, and exchanging writing ideas and learning from good examples and using them as guidelines for students' own writing. Peer-rating and public evaluation could be applied in writing task assessments. The teacher should familiarize students with the writing format, grammar, and vocabulary. Moreover, teachers must assist students in completing writing tasks by giving feedback, suggesting writing ideas, and teaching useful language expressions.
- **Gamification design:** Students usually enjoy competing with their classmates, while developing their English writing skills. Considering this, points and achievements were used as rewards to encourage students to do the tasks on MALL applications.
- The design principles in **Table 3** based on the data from previous literature reviewed and as well as from the findings reported above. MALL, TBA and gamification were taken into consideration to establish the design principles combined with UX and needs which were categorized in to four aspects: Internet usage, English writing tasks, English writing teaching, and gamification design.

Table 3: Design principles used in this research

Design Principle	Description
DP1	Digital interactions between contents, peers, and teachers in a mobile language learning application
DP2	Learning process and activities focused on constructed knowledge from learners' experiences and interests
DP3	Students' engagement with game elements and peers
DP4	Facilitating learners to initiate ideas and produce written works

As stated above, they were the foundations of design principles for developing the interventions in this research. The objectives were to aid and enrich a mobile language learning environment, improve students' motivation to develop English writing skills and practice language tasks relevant to their experience with sufficient support.

In order to apply the design principles in Table 3 designing elements and constructing Sandoval (2014)'s conjecture map to plan and organize tools to design interventions (Wongwanich, 2020) for enhancing English writing skills, design elements (Embodiment) were initially identified. Eight English writing tasks were embedded in a lightweight and responsive MALL application with a hierarchical structure and writing learning process and activities. The task structure consisted of eight real-world writing tasks and activities relevant to students' experiences. Additional resources were also included to support students while completing the tasks. The structure tracked how learners took part in each learning phase in the activities. Then, students gathered points and achievements on the MALL application and shared experience and ideas concerning the writing topics as the discursive practices. For the next component in the conjecture map, mediating process referred to observable interactions and participant artifacts (Sandoval, 2014). Through such interactions, students were observed accessing learning contents, engaging in activities, writing tasks, sharing their ideas and experience with their peers, as well as editing and revising their writing tasks via the MALL application. Additionally, participant artifacts were considered evidence for learners' English writing evaluation. To assess their writing

skills, the completed writing tasks were evaluated. As a result, students earned digital badges and points, as well as comments and suggestions from their peers. The last component, intended outcomes, was English writing skills, which the researchers expected see after students have engaged in all the design elements and mediating process. Figure 1 portrays the relationship between the design principles for the research in Table 3 and the design elements in this research.

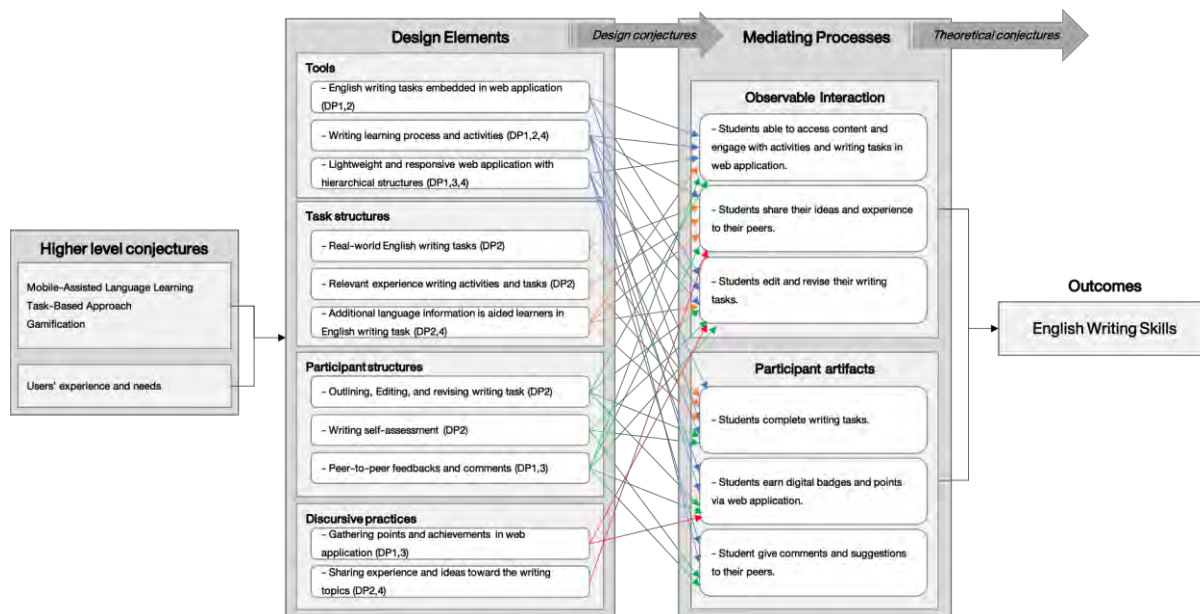


Figure 1: The initial conjecture map of the interventions used to enhance English writing skills

5.2.2 Interventions form the design principles

According to the conjecture map, the designed the writing learning process, as the writing teaching procedures, consisted of seven phases as follows: (see Figure 2).

1. **Selecting themes:** The teacher analyses contexts and learners' characteristics, sets learning objectives, and chooses a writing topic.
2. **Exploring topics:** Learners explore the topics, tasks, objectives of the lesson, and supportive information connected to their experiences and prepare to write by brainstorming, discussing, sharing information, and exchanging experiences.
3. **Drafting ideas:** Learners do the writing activities, examine writing samples/guidelines, and learn useful vocabulary, phrases, and language structures.
4. **Editing tasks:** Learner design and develop their writing product based on the information obtained in the previous phase, drafting ideas and submit the final product on the MALL application.
5. **Giving feedback:** Learners explore peers' tasks, rate them, and give comments.
6. **Reviewing submissions:** Learners edit their work according to the teacher's and peers' suggestions and recommendations and resubmit the writing task.
7. **Concluding findings:** Learners and their teacher summarize suggestions, errors, and language structures, and learn from them.



Figure 2: Seven steps of the learning process integrated with MALL, gamification, and TBA

For each the learning process, the researchers had designed the writing activities which were tools and guidelines for facilitating the writing learning process for enhancing English writing skills of learners. Then, writing activities for each phase were designed as shown in Table 4.

Table 4: Writing activities in different learning phases

Writing activities	Description
Pre-task: Exploring topics	
Sharing information	Discussing and exchanging information and prior knowledge related to the given topic
Introducing vocabulary	Presenting related vocabulary, phrases, and useful expressions about the topic
Designing the overview	Designing a mind map, diagram, flowchart, or outline on the topic
Determining the goal of writing	Selecting the purpose of writing, such as to reflect, to inform, to persuade, and to evaluate
Task process: Drafting ideas	
Exploring related words	Doing exercises that focus on finding vocabulary, phrases, and helpful expressions
Linking words	Adding linking words between sentences or paragraphs
Practicing language structures	Completing grammar exercises
Ordering sequence	Ordering a series of events or steps in a process
Writing guidelines	Examining the writing guidelines, layout, organization, and style
Task process: Editing tasks	
Participating in writing	Collaborative drafting, outlining, and editing writing product
Designing and developing writing products	Producing a draft using the information from the previous stages and editing it.
Task process: Giving feedback	
Rating writing products	Evaluating peers' writing products
Suggesting and commenting	Giving comments and suggestions on the peer-writing products
Task process: Reviewing submissions	
Revising	Improving own writing products according to suggestions from peers and teachers
Language focus: Concluding findings	
Discussing	Sharing opinions about writing products
Summarizing	Concluding what learners have learned from writing (issues, grammar, style, vocabulary, and main points of writing.)

In the conjecture map, the third design element for MALL application included lightweight, responsive displays (see Figure 4) and a hierarchical structure (see Figure 3) of the MALL application. This MALL application assisted

learners in accomplishing the writing task in digital language learning with game elements. The newly designed and developed MALL application; responsive web application; was called KidKian (<https://kidkian.edii.in.th>), which was transcribed from the Thai language. It is a combination of two Thai words: “Kid” meaning to think, and “Kian” meaning to write. WordPress and various plugins, such as wpDiscuz, WP User Frontend, and Ultimate Member, were used as web development tools. In this MALL application, the GamiPress plugin was used to place game elements on this application. Users could earn points, gems, and energy by doing specific tasks, such as giving comments, uploading completed tasks, and visiting the application. Furthermore, users could receive feedback in the forms of scores or comments from their friends and teacher. The wpDiscuz plugin was used to allow learners and teachers to give feedback and suggestions on each writing task.

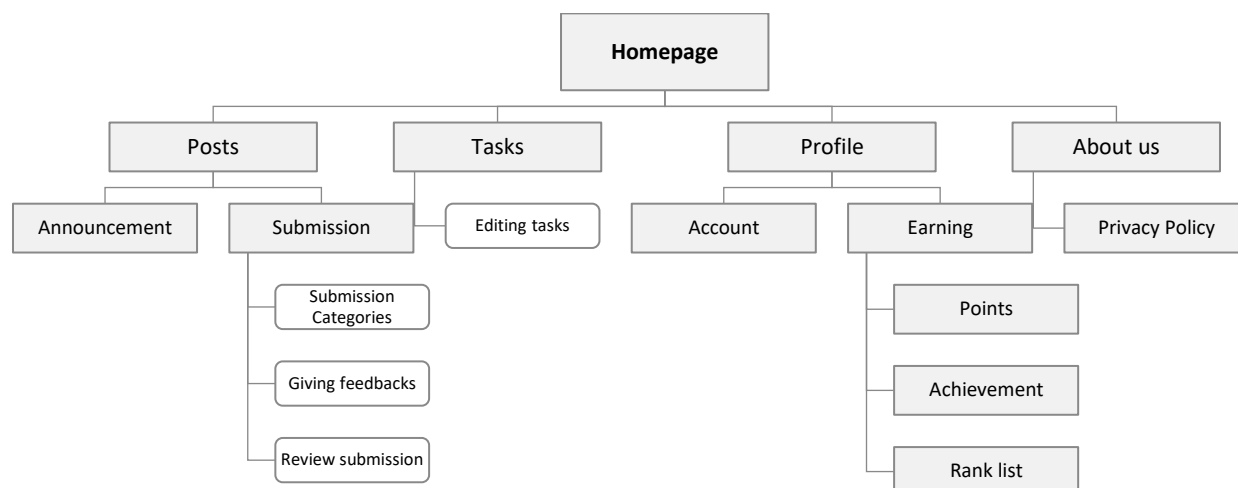


Figure 3: Hierarchical structure of MALL application

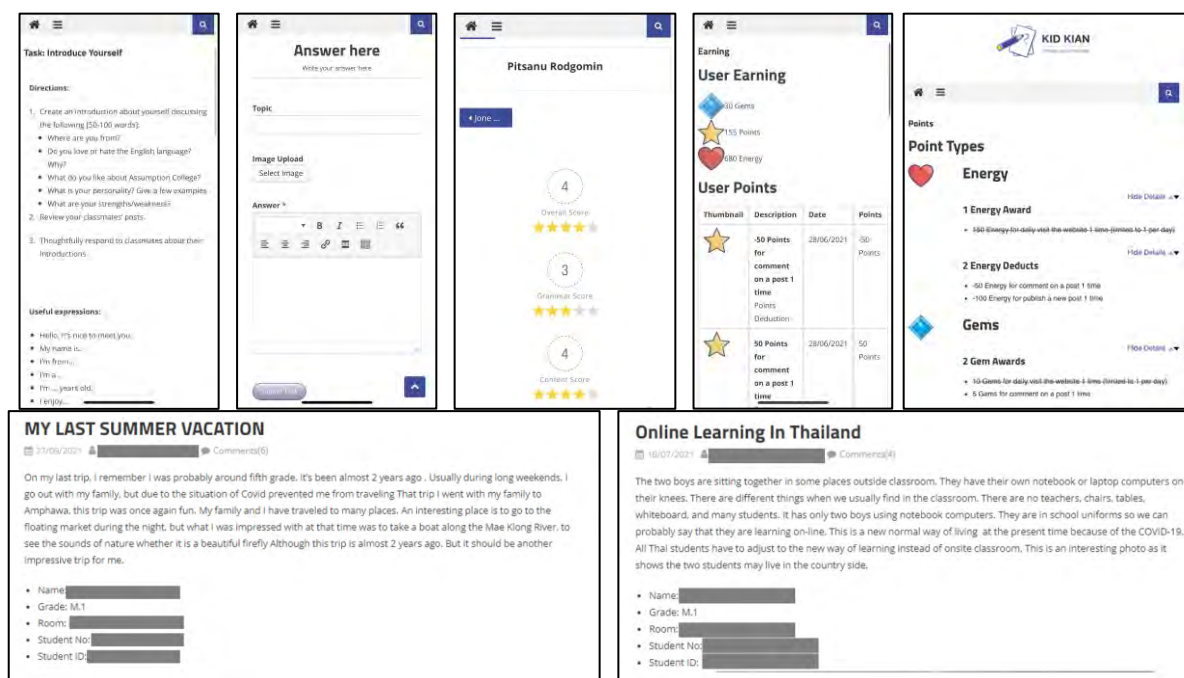


Figure 4: User interface of the MALL application a mobile device and desktop displays

5.2.3 Testing interventions

Five experts in mobile learning, gamification, and TBA validated the design principles behind the conjecture mapping, and interventions. They evaluated the characteristics of the interventions, design arguments, design principles, components of the MALL application, writing learning process and activities, and activity design. The results were calculated for means. Statements with a score of higher than 4 were endorsed and those with a score of lower than 4 were revised (see **Table 5**).

Table 5: Experts evaluation results

Topics	Mean (n=5)	Meaning
The characteristics of the interventions on the MALL application and writing learning process and activities	4.20	Endorsed
The design arguments of the MALL application and writing learning process and activities.	4.20	Endorsed
The design principles behind conjecture mapping to develop the MALL application and writing learning process and activities	4.60	Endorsed
The components of the MALL application and writing learning process and activities.	4.60	Endorsed
The design of writing learning activities	4.60	Endorsed
Overall	4.44	Endorsed

The average mean score for all the statements was 4.44, suggesting that the design principles and interventions could be implemented with lower secondary EFL students. However, three aspects needed to be revised and modified according to the experts' suggestions (see Table 6).

Table 6: Experts' suggestions and revisions

Suggestions	Revisions
Students should be encouraged to set a goal of writing during the pre-task stage. This will help them to orient themselves to the task and the appropriate level of language.	A goal setting activity was added to the pre-task writing activities.
It is unclear whether the students are to find sample writings themselves or the teacher provides them. Will 'searching skills' be the case here?	The researcher provided the additional resources which would help students to complete their writing tasks on the MALL application.
The user experience and user interface of the MALL application could be improved to be more attractive, and more game elements could be added	Side widget was added to display points, ranks, and achievements.

5.3 Implementing the interventions

The interventions aim to enhance the improvement of English writing skills for EFL lower secondary students. The experiment was applied to a sample of 35 EFL lower secondary students. The samples were EFL grade 7 students in a private all-male school in Bangkok, Thailand. In addition, all of them can use the internet from their accommodation and use their device to connect to the internet (Table 7).

This experiment occurred during the COVID-19 pandemic, whereupon the interventions were completed through online remote learning for an eight-week implementation.

Table 7: Demographic of the samples

Questionnaire items		frequency	%
Gender	male	35	100.00%
	female	0	0.00%
Internet usage for doing assignments (per week)	1-2 hour(s)	14	40.00%
	2-3 hours	13	37.14%
	3-4 hours	0	0.00%
	4-5 hours	2	5.71%
	6-7 hours	0	0.00%
	7-8 hours	0	0.00%
	more than 8 hours	2	5.71%
Do you have a personal computer?	Yes	35	100.00%
	No	0	0.00%
Can your personal computer connect the internet?	Yes	35	100.00%
	No	0	0.00%
Do you have a mobile phone?	Yes	34	97.14%
	No	1	2.86%
Can your mobile phone connect the internet?	Yes	34	97.14%
	No	1	2.86%
Do you have a tablet?	Yes	20	57.14%
	No	15	42.86%
Can your tablet connect the internet?	Yes	29	82.86%

Questionnaire items		frequency	%
	No	6	17.14%
Which device do you use for remote learning?	iPhone	6	17.14%
	Android phone	15	42.86%
	Android tablet	2	5.71%
	iPad	10	28.57%
	Personal computer	11	31.43%
	Laptop	24	68.57%

The findings show the significant differences in the pre-and post-test. Data from the tests were analysed using SPSS. Table 8 shows that the average of the pre-test was 18.08 (S.D.= 4.74), while the average of the post-test was 22.48 (S.D.= 3.07). Both of the tests showed that the post-test score was higher than the pre-test at the .05 level of significance.

Table 8: T-test results for the pre-and post-test by the samples

	Mean	n	S.D.	t	df	p
Pre-test	18.08	35	4.74	-6.96	34	.000
Post-test	22.48	35	3.07			

Notes: $p < 0.05$.

Table 9 shows the English writing skills result in weeks 1,3,5, and 7. Analysis of the difference in English writing skill average scores of the samples used the repeated measure. Overall, the sample continuously had better scores. The results of the week 1 and week 3 assessments were at the Good level (Mean = 17.611, 18.71), and the week 5 and week 7 assessments were at the Excellent level (Mean = 20.223, 21.066). The difference was statistically significant at the .05 level ($F=1579.266$, $\text{sig}=.000$) (**Table 10** and **Table 10**: Result of one-way ANOVA with repeated measure analysis for weeks 1,3,5, and 7

	Source	SS	df	Mean Square	F	sig
Writing skills	Intercept	52713.683	1	52713.683	1579.266	.000
	Error	1134.872	34	33.379		

Notes: $p < 0.05$.

Table 9: Descriptive analysis of the writing evaluations for weeks 1,3,5, and 7

	Evaluation											
	Week 1			Week 3			Week 5			Week 7		
	Mean	S.D.	Level	Mean	S.D.	Level	Mean	S.D.	Level	Mean	S.D.	Level
Writing skills	17.611	4.940	Good	18.710	3.48	Good	20.223	2.90	Excellent	21.066	3.598	Excellent

Table 10: Result of one-way ANOVA with repeated measure analysis for weeks 1,3,5, and 7

	Source	SS	df	Mean Square	F	sig
Writing skills	Intercept	52713.683	1	52713.683	1579.266	.000
	Error	1134.872	34	33.379		

Notes: $p < 0.05$.

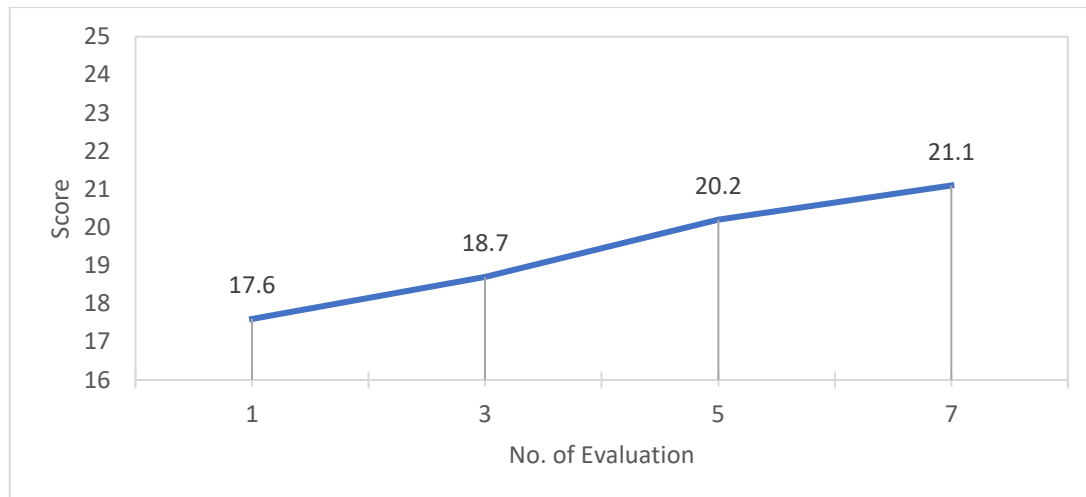


Figure 5: Average score of the English writing skills

After the experimental study using the intervention, the researchers conducted an opinion survey among the participants. It was found that overall opinion was at a high level (Mean=4.38, S.D.=0.13). As for the score for appropriateness and suitability for learning, the opinion towards the MALL application and learning process had the highest level (Mean=4.56, S.D.=0.10), while the acceptance and usability of the MALL application and learning process had the high level (Mean=4.49, S.D.=0.12) (Table 11).

Table 11: Descriptive analysis of the learners' satisfaction

Topics	Mean (n=35')	S.D.	Satisfaction level
Overall satisfaction for the MALL and writing learning process	4.56	0.12	High
The MALL writing learning process is appropriate and suitable for learning.	4.56	0.10	Very high
The MALL application and learning process are acceptable and usable for learning.	4.49	0.12	High

6. Discussions

6.1 Persona of Thai learners in internet use and learning writing skills

According to the survey results, the majority of Thai students can access the internet through any device, whether it is a smartphone or computer. The Thai government and Ministry of Education have formed a policy for remote learning in response to the pandemic situation caused by the Coronavirus 2019 or Covid-19 that has contributed to this significant increase in the number of digital devices and usages. Additionally, present learners are considered to be representatives of Generation Alpha with advanced technology skills who can use technology effectively (Nagy and Kölcsey, 2017). Al-Emran, Elsherif and Shaalan (2016) studied the acceptance of m-learning as significant assistive technology. Learners will be more willing to cooperate with m-learning as a tool for enhancing their learning if the adopted technology is known to them and corresponds to their requirements.

Moreover, the survey results show that the learners dramatically need proper English writing instruction, a variety of tasks, and relevance to their daily life. Some of Thailand's English teaching problems were caused by instructors such as the lack of the integration of language skills in teaching, less active and interactive language learning in the classroom, more grammar-based instruction, and conducting learning activities irrelevant to the learners' needs. (Mejang and Suksawas, 2021).

6.2 Design principles for MALL application and learning process for writing skills

Then, the interventions of the MALL application, learning process, and activities were based on users, learners, and the literature review. It was found that the MALL application that was accessible anywhere and anytime via the internet for self-practice could enhance writing skills and motivation. This is consistent with Yundayani, Kardijan and Herawan (2019)'s findings in that most students think that ICT integrated with task-based activities has a crucial influence on their motivation for learning English. These interventions' characteristics were real-world tasks, learners' interests in writing topics, peer-rating evaluations, responsive MALL applications, English

writing learning activities on MALL applications, and digital badges, points, and achievement as rewarding feedback. The responsive MALL application enables learners to learn, explore, collaborate, and exchange information through the internet on any mobile device (Mingsiritham and Koraneekij, 2020). However, these design principles are generated for Thai learners' contexts. These principles need more data for the iterating to be appropriate to other EFL learners from different backgrounds.

6.3 Result of implementation of the interventions

The score in English writing skills demonstrates that students' English writing skills improved. This might be related to learners' familiarity with the MALL application and writing pattern. Effective utilization of treatments has resulted in the development of skills and a positive attitude. Rewarding and providing feedback might motivate students to improve their writing skills. This is consistent with Pourdana, Behbahani and Safdari (2011) stating that utilizing a variety of tasks offers EFL learners the chance to engage in authentic interactions. According to this study's experimental findings, EFL learners find it pleasurable to perform differently on writing tasks with variety. Moreover, Al-Hamad, al-jamal and Bataineh. (2019) identified significant differences between the control and experimental groups in the use of mobile language learning-assisted mobile applications to improve English writing skills. The use of technology in learning also promotes interest in language acquisition (So, et al., 2017) interaction, emotion, motivation, feedback, and linguistic knowledge (Golanka, et al., 2014) as well as access to learning through a variety of displays at anytime, anywhere (Khlaissang, 2018). In addition, the application of gamification, makes learners enjoy learning a language where gamification is part of the variable that boosts the learner's motivation, and language learning efficiency (Elaish, et al., 2019) and can also be applied to mobile applications in language learning (Elaish, et al., 2017)

7. Conclusion and Recommendations

The use of mobile technology in education offers new opportunities to integrate onsite learning and online learning and learning at convenience. The initial design principles and the conjecture map for development in this research were based on the analysis of user experience and needs and literature review. Therefore, the design elements and mediating process that brought about the improvement in English writing skills as the desired outcomes were the MALL application and the writing learning process with activities. The MALL application features were chosen from the characteristics of technology that could enrich the second language learning environment, hierarchical structures, lightweight and responsive displays, and game elements. The writing learning process consisted of seven phases and writing activities, which supported learners to construct their language knowledge and experience to complete writing tasks. The finding from the implementation can be the evidence that EFL learner will achieve the highest level of language proficiency and communication ability in learning English via using responsive technology and communicative teaching method. This is a very useful innovation teaching English writing skill for EFL lower secondary students in Thailand. The suggestion for future research is to study the effect of this MALL application for other language skill and other group of learners.

7.1 Recommendations

Firstly, this research was confined to EFL lower secondary students and instructors. The viewpoints of EFL students at different educational levels about gamification and TBA might be investigated via further studies. The basic design principles and conjecture map may then be iterated and rebuilt in an attempt to generalize the design principles for this educational method.

Secondly, the teacher should also consider the Bring Your Own Device (BYOD) policy and the internet infrastructure required to access the MALL application when implementing these interventions in the classroom.

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