

Design and Development of Online Learning Everywhere: A Mobile Application for Online Training

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Abstract: The hectic schedules of people, especially those who are already committed to work or family, physical classroom training makes it difficult to schedule their classes since it might conflict with the course offered. Moreover, a study indicated that students do not prefer physical classes because other commitments make it difficult to attend classes on campus. Therefore, this study aims to address the problem by designing and developing a mobile application (app) for online training. As mobile phones have become all-pervasive and necessary in people's lives, a mobile-based online training app significantly benefits and is convenient for anyone, especially busy and working people. The design and development of the app followed the System Prototyping Methodology. This methodology consists of planning, analysis, design, and implementation phases. Online Learning Everywhere (OLE) prototype was developed based on the gathered requirements and a usability study was conducted to evaluate the app's functionality. The evaluation result showed that most of the participants were satisfied with OLE. The study contributes toward an understanding of the system requirement and user interface of a mobile app for online training

Keywords: *Training, Online Learning, Mobile application, Smartphones, Distance learning*

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1. Introduction

Training is a process of enhancing personal's abilities, skills, and knowledge. It is not limited to employees for work competencies improvement but also as an opportunity for students to develop skills and abilities to empower them to pursue a professional career in their future. The research on workforce development needs has proven that besides the relevant work experience, employability skills for a particular job are also an essential factor in recruitment [1]. Many companies are concerned about the suitability and ability of applicants as it may affect their business. Hence, skills development is vital for anyone to advance in their careers. However, traditional or face-to-face classrooms

require personal involvement and fixed time commitment for people to attend class according to the given place and time. Most busy people who have to commit to their time for work or study find it difficult to commit to fixing training time, leading to lost learning opportunities. Online courses opened new paths that enabled people to learn at their own pace.

According to the statistics on online education, over 3 million students took at least one course online in 2017, and the number continues to grow in 2018 [2]. The research indicates that students choose online courses because of other commitments that restrain them from attending a face-to-face classes. It proves that some students require flexible learning hours to balance their time between classes and other activities. In addition, the Covid-19 pandemic also hugely

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impacted online education. It has initiated a digital transformation of all levels of education. [3]. Online learning is considered by most governments in the world as the only solution to ensure that the continuity of the learning process from elementary school to university continues [4].

Meanwhile, from an employee perspective, online training is a platform to sharpen their skills and enhance their performance. However, juggling work and learning is challenging, especially finding a suitable time to attend a physical class. Time conflict is one of the main barriers, especially for those studying part-time or working part-time jobs while studying. Moreover, maintaining a work-study-life balance is difficult [5]. If it is not managed well, it might impact health due to less sleep or rest. Furthermore, it could affect the brain and weaken performance in both work and study. Consequently, students' results might be affected and thus be stressful.

Due to this problem, there is a need to have an online training application (app) that provides a flexible timetable. Furthermore, as smartphones become pervasive and everyone uses mobile phones daily, they fully integrate into our lives[6], [7]. Hence, a mobile app could be an effective tool for facilitating learning. Therefore, this study aims to design and develop mobile-based online training. As a result, a mobile app prototype named Online Learning Everywhere (OLE) was developed and evaluated. With this application, users can customize their learning environment, and all the materials are able accessed 24/7, which is no time constraint. Furthermore, the study contributes toward understanding the system requirements and user interface for such apps. This section will continue to describe the background and related studies, design and development of OLE, usability evaluation of OLE, and future works in the following sections.

2. Background and Related Studies

This section describes the background of mobile-based online training and related studies investigating the limitation of physical classroom training. The development of the rapidly changing knowledge economy means that people need to improve their skills throughout their adult lives to cope with modern life, not only in the field of work but also in their personal life [8]. Many companies or organizations have enrolled their employees in a training program to improve their competencies, knowledge, and job performance. The companies have sought to rely on improved competencies of the talented workforce to create competitive advantages [9]. However, enrolling in a training program may pressure the employee as they need to handle the workload and learn the course simultaneously. When the number of work increases, employees face stress and anxiety, which could affect their ability to focus on a task. Several past studies identified the general barriers in physical classroom training, which are time barriers, location barriers, and financial barriers [8], [10], [11]. Time barriers are one of

the major limitations faced by most trainees.

Traditional learning is a good option for people with more free time in their daily schedule. However, for people who are already committed to work or family, flexibility is one of the key aspects they need to consider before enrolling for any course because they must attend class at a specific time. Hence, their schedule must fit the course time offered. However, not every course offered day and evening classes. As a result, it could be challenging for everyone to manage their time to fit with the desired course duration. Lack of time has been reported as the main barrier to learning for various professional groups such as teachers, nurses, managers in small and large firms, and accountants [12], [13]. The research found that having too many jobs to do at work makes learning difficult [10]. It has proven that the professional group of people regularly have heavy workloads, causing them insufficient time to participate in any course.

Location barriers are partly related to time barriers. Usually, employees choose the training location near where they work to reduce their traveling time and ensure they attend the class on time. However, some job requires much travelling to pursue the task. In this case, allocating fixed time to attend physical training classes is challenging. The location barrier is also applicable to those who do not have transportation [11]. The time in using public transport and the distance from the workplace to the training place will significantly impact the total time required to attend a physical class.

The third barrier reported by Crouse et al. [13] was a lack of money which is a financial barrier. Four participants in the study indicated they had no money to enrol in courses due to high fees. Training costs were categorized as direct and indirect costs [8]. Trainees need to cover both direct and indirect costs in training. As stated above, if trainees do not have their own transportation, it is not convenient for them and takes longer. It thus increases the cost of travel to form workplace and training place. It included not only the fee of trainees need to cover but also the fee of the organization to provide the training, such as venue, instructor, and learning materials. It was costly to update and reproduce outdated learning materials. Due to the three learning barriers, it was found that flexibility [14], accessibility [15], convenient [16], and cost-saving is the key factor in facilitating training. Online learning platforms were introduced to increase the accessibility to larger segments of the public, as summarized in Table 1.

Table 1. The list of related studies of the online learning platform

Related Studies	Description
Khan Academy [17]	Khan Academy provides personalized learning where students can practice at their own pace. The system offers learning materials with videos and exercises in the different content sectors; to help address the education challenges facing countries worldwide. It is a free learning platform for both learners and teachers. By using the system, teachers quickly provide instruction to meet every student's needs.

MOOCs [18]	Massive Open Online Courses (MOOCs) allow many users to participate freely in online courses through the web without time or location limitations. The system aims to deliver quality educational experiences at scale and provide a flexible way for users to learn new skills. The unique features make it an effective technology-enhanced learning model in higher education.
Coursera [15]	Coursera is a social entrepreneurship company that partners with many of the world's top universities to offer free courses online for anyone to enrol. Coursera hopes to provide a more collaborative and interactive experience for students who cannot access elite education opportunities.

The emergence of digital devices such as computers, tablets, and mobile phones has facilitated online training. Offered online courses are the best solution to address the limitation for continuous learning faced by busy or working people. Mullen et al. [14] found that flexible scheduling is crucial for people with work and life demands. It reflects that one of the critical factors for continuous learning is convenience. Online training is more convenient because it makes learning materials easily accessible using smartphones or laptops. Since people nowadays always have their smartphones and laptops, those materials can be accessed anytime. Therefore this study aims to design and develop an application for online training that could facilitate the users' learning and training.

3. Methodology of the Study

The study was conducted by adapting System Prototyping [20]. System prototyping methodology is a system development method that involves prototyping in gathering the requirement, testing, and refining as necessary until the final system is satisfied by the user. It consists of four phases: planning, analysis, design, and implementation—the flow of the phases is illustrated in Figure 1.

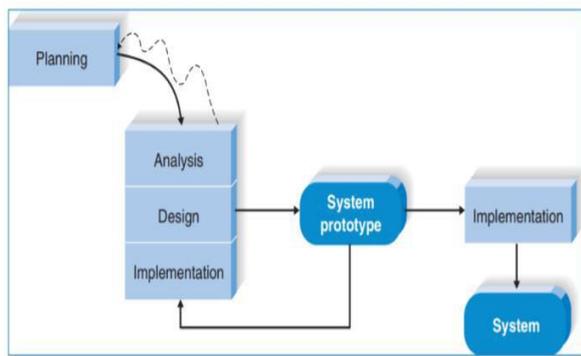


Figure 1. The phases of System Prototyping Methodology

The planning phase includes identifying the problems, objectives, significance, scope, and the system's schedule. It is fundamental to help clarify the process needed to complete efficiently. The requirements of mobile-based online training will be analyzed by conducting a requirements analysis process. The requirements are documented and visualized using Unified Modelling Language (UML) diagrams,

including the use case diagram, activity diagram, and class diagram. The system prototype was developed when the mobile app's user interface was designed. Users are involved during the design stage, where they suggest improving the user interface and requirements of the online training app. Then, a usability study is conducted to evaluate the functionality of the online training app. Finally, during the implementation phase, the mobile app is observed and monitored regularly to measure the performance of mobile-based online training. The details of the implementation of the phases are explained in the following sections.

4. Design and Implementation of OLE

This section describes the design and development of mobile-based online training. The section is divided into two sub-sections; (1) the requirements of OLE and (2) the prototype of OLE, a mobile app developed to demonstrate the gathered requirements.

The requirements of the mobile-based online training

A requirements gathering process was conducted using two methods: (1) interviewing the CEO of LNH Academy and (2) analyzing documents and apps from the Internet regarding the online training. The interview was conducted with interviewing the CEO of LNH academy. A few open-ended questions have been asked to identify the problem and expected features of the system. An example of the question is; what features of the mobile app for online training would you like to have, what is the problem with your current system, and which courses are the most popular? The opinion and suggestions have been recorded, and the requirement was elicited.

For the second requirements gathering process, the documents were gathered using the Google search engine by giving the keywords of "online training", "online training courses", "training platform", "course learning", and "online tutorial". Then, the documents were analyzed as a reference for the requirement for mobile-based online training. Table 2 lists the requirement of OLE, which includes registering, logging, managing course, managing quiz, managing trainee profile, viewing the course, enrolling course, and viewing content.

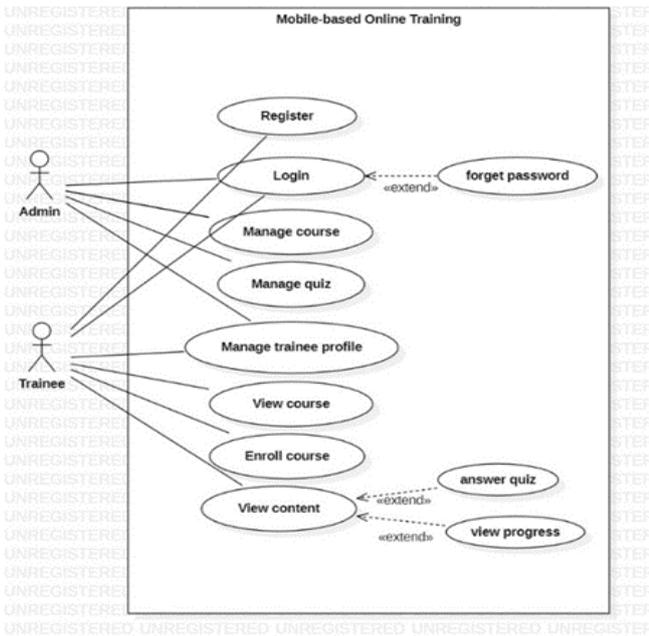
Table 2. List of OLE Requirements

ID	Requirement Description	Priority
1	Register	
1.1	A new trainee must register before login to the system.	M
1.2	System shall allow trainee to register an account by enter their personal information and password.	M
1.3	System did not allow trainee to register with the email that has been registered.	M
2	Login	
2.1	System shall allow user to login with their email and password.	M
2.2	System shall enable user to reset password.	O
2.3	System shall display an error message if user enters incorrect email or password.	M
3	Manage Course	
3.1	System shall allow admin to view list of course.	M
3.2	System shall allow admin to add course.	M

3.3	System shall enable admin to edit course information or content.	M
3.4	System shall enable admin to delete course.	M
4	Manage Quiz	
4.1	System shall allow admin to view list of quiz.	M
4.2	System shall allow admin to add quiz.	M
4.3	System shall allow admin to edit quiz.	M
4.4	System shall allow admin to delete quiz.	M
5	Manage Trainee Profile	
5.1	System shall allow only admin can view list of trainees.	M
5.2	System shall enable user to view trainee profile	M
5.3	System will allow user to edit trainee profile	M
5.4	System will allow only admin can delete trainee profile	M
6	View Course	
6.1	System shall display the list of course by category that trainee can view by category	D
7	Enroll Course	
7.1	System will allow trainee to view a course description	M
7.2	System will allow trainee enroll a course	M
8	View Content	
8.1	System will allow trainee access the course material after they enroll a course	M
8.2	System will allow trainee answer the quiz in objective question.	M
8.3	System enables to track the progress of the course	M

Figure 2. The OLE use case diagram

The Unified Modelling Language (UML) has been used to visualize the app’s requirements, as listed in Table 2. At this phase, use case diagrams and sequence diagrams as



behavioral diagrams models have been produced to represent the list of requirements, while the class diagram represents the structural components of OLE. Figure 2 illustrates the use case diagram and the communication between the use case and the actors for OLE. The use cases are registering, logging, managing the course, managing the quiz, managing the trainee profile, viewing the course, enrolling the course, and viewing the content.

5. OLE Prototype Development

A prototype of mobile-based online training named Online Learning Everywhere has been developed as the requirement explained in the previous subsection. Software prototyping is a standard way of presenting software requirements; based on the users’ experience interacting with the prototype so that further comments and recommendations can be obtained. The system prototype was developed using Visual Studio Code and Android Studio 3.5. Further, Cpanel web hosting is a database for data storage. The selected interface of OLE is shown in Figures 3, 4 and 5.

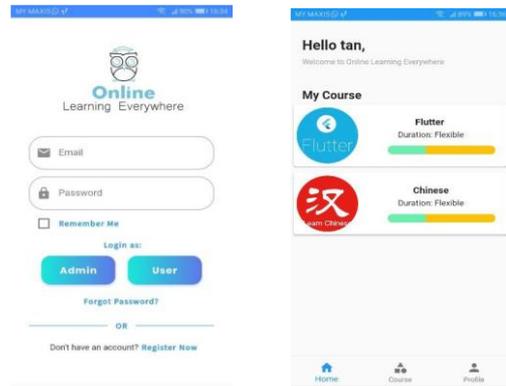


Figure 3. The interface for login (left) and the home page (right)

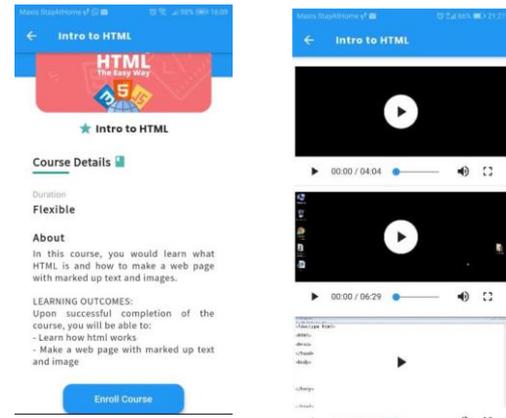


Figure 4. The interface for course description (left) and video content (right)



Figure 5. The interface for PDF content (left) and quiz (right)

6. Evaluation of OLE

A usability evaluation has been conducted to collect participants' opinions on the application's convenience, usability, and satisfaction. The evaluation involves 30 respondents: full-time students, part-time students, and workers. The respondents were randomly invited by friends and family using recruitment email and participated in the study voluntarily. The instrument used for the evaluation is a post-task questionnaire. The post-task questionnaire was adopted from the USE [21], consisting of 32 questions with two sections. Section A asked the respondent's demographic and background information, while Section B asked the participants' opinions about Online Learning Everywhere (OLE) on a five-point Likert Scale where one represents strongly disagree and five represents strongly agree. The respondent performed the following step-by-step procedure for the evaluation: (1) read the information sheet and sign the consent form, (2) interact with the OLE app, and (3) answer the post-task questionnaire. In addition, a few respondents were selected for the remote study to guide them in using OLE and get their feedback about the app.

The analysis of respondents' demographic and background information shows that 53% were full-time students, 20% were part-time students, and 27% were workers. In addition, 67% were female, while 33% were male respondents. Regarding the respondents' age group, there are no respondents for the first age group between 10 to 16. The second age group was between 17 to 23, it occupied 63% and followed by the age group of 24 to 30, which occupied 30%. The last two age groups, 30 to 36 and over 36, accounted for 3% respectively. All the respondents (100%) used the mobile app daily. Regarding the convenience of mobile-based online training, 80% of respondents agree that mobile-based online training is convenient for a worker. However, 3% of the respondents disagree with the statement, and 17% are unsure about it.

Next, 80% of the respondents agree that mobile-based online training will help reduce the problem faced during face-to-face class for a part-time student while 3% disagree. 17% of the respondents were not sure about it. 57% of them agree that online training is necessary for a student, whereas 20% of the respondents disagree about it. The rest of 23% of the respondent was not sure about it. Regarding the importance of mobile-based online training nowadays, 67% of the respondent agree that mobile-based online training is essential. Follow by 7% of the respondent disagreed, and 27% of the respondents were not sure about it. 47% of the respondents had heard about "Mobile Based Online Training", while 37% had not heard about "Mobile Based Online Training" before. 17% of the respondents were not sure about it. The majority of the respondents (77%) had used an online learning platform to learn a course. 13% of the respondents had never used an online learning platform, while 10% of respondents were not sure about it.

An analysis was conducted on the respondent' responses in Section B of the post-task questionnaire. It measures the

respondent's perception of OLE's usefulness, ease of use, and satisfaction with OLE. Tables 3, 4, and 5 show the result of the respondents' evaluation using OLE. The majority of respondents rated agree or strongly agree.

Table 3. The respondent's response on the usefulness of OLE

The post-task questionnaire items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
OLE enhances my effectiveness to learn the course.	2 (6.7)	2 (6.7)	11 (36.7)	10 (33.3)	5 (16.7)
OLE makes easier to learn a course.	0 (0.0)	3 (10.0)	13 (43.3)	9 (30.0)	5 (16.7)
OLE helps to improve my knowledge and skills.	0 (0.0)	2 (6.7)	14 (46.7)	8 (26.7)	6 (20.0)
OLE meets my needs.	0 (0.0)	3 (10.0)	12 (40.0)	10 (33.3)	5 (16.7)
OLE does everything I would expect it to do.	1 (3.3)	4 (13.3)	15 (50.0)	5 (16.7)	5 (16.7)
OLE is useful in overall.	0 (0.0)	1 (3.3)	12 (40.0)	10 (33.3)	7 (23.3)

Table 4. The respondent's response on ease of use of OLE

The post-task questionnaire items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
OLE is easy to use.	0 (0.0)	0 (0.0)	12 (40.0)	11 (36.7)	7 (23.3)
OLE is user friendly.	0 (0.0)	0 (0.0)	12 (40.0)	9 (30.0)	9 (30.0)
OLE is flexible.	1 (3.3)	4 (13.3)	14 (46.7)	4 (13.3)	7 (23.3)
OLE is easy to learn how to use it.	0 (0.0)	0 (0.0)	14 (46.7)	9 (30.0)	7 (23.3)
I can use OLE without written instructions.	0 (0.0)	5 (16.7)	14 (46.7)	6 (20.0)	5 (16.7)
I can easily remember how to use OLE.	0 (0.0)	3 (10.0)	14 (46.7)	7 (23.3)	6 (20.0)
I do not notice any inconsistencies when using OLE.	1 (3.3)	5 (16.7)	14 (46.7)	7 (23.3)	3 (10.0)
I can recover from mistakes quickly and easily when using OLE.	0 (0.0)	7 (23.3)	10 (33.3)	8 (26.7)	5 (16.7)
I can use OLE successfully every time.	0 (0.0)	2 (6.7)	18 (60.0)	6 (20.0)	4 (13.3)

Table 5. The respondents' responses on their satisfaction with OLE

The post-task questionnaire items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am satisfied with OLE.	0 (0.0)	3 (10.0)	13 (43.3)	8 (26.7)	6 (20.0)
I would recommend OLE to my friend.	0 (0.0)	1 (3.3)	13 (43.3)	11 (36.7)	5 (16.7)
OLE works the way I want it to work.	1 (3.3)	3 (10.0)	10 (33.3)	11 (36.7)	5 (16.7)
I feel I need to have OLE to learn the course.	0 (0.0)	1 (3.3)	13 (43.3)	11 (36.7)	5 (16.7)
OLE is wonderful and pleasant to use.	0 (0.0)	1 (3.3)	8 (26.7)	12 (40.0)	9 (30.0)

The result of the evaluation showed that the respondents were satisfied with OLE. Further, the respondents reported they are satisfied with the time it took to complete the task and the ease of OLE completing it. The analysis of respondents' feedback about the features offered by OLE

shows that they agree that the course learning materials were useful and easy to understand and intended to recommend OLE to their friends. The respondent reported that OLE is user-friendly and pleasant to use for the user interface. However, a few respondents faced a problem when using OLE. They indicated that OLE could not recover from mistakes quickly and easily.

Hence, there is a need for further enhancement in this feature to ensure peak performance. In addition, more studies should be done to identify requirements to ensure OLE is more effective and flexible in assisting online learning. It also should perform further software testing always to ensure consistence performance.

7. Conclusion and Future Works

This paper described the design and development of mobile-based online training named Online Learning Everywhere (OLE). Many aspects of design features for such an application (app) can be studied. The past studies suggested the adoption of technology in training has a significant impact on trainee and better meet the trainees' needs. Furthermore, a mobile application gives flexibility and accessibility where users can customize their learning environment, learning anytime, everywhere. However, based on the evaluation result, some respondents indicated that OLE does not work as they want it to. Since everyone has their perception, OLE might not fulfil everyone's needs. In the future, the application's functionality could be expended and improved; keep updated the courses and learning materials to ensure it follows the needs of the user market.

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