

# TECHNOPRENEURSHIP MOBILE APPLICATION (TMA): A SUPPORT MECHANISM FOR FLEXIBLE LEARNING DELIVERY SYSTEM

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## ABSTRACT

*Mobile phones are essential in our daily lives because of their benefits in communication, entertainment, and education. Students use their mobile phones in teaching-learning engagement, both synchronous and asynchronous. The study focused on developing and validating Technopreneurship Mobile Application (TMA) in its functionality, reliability, usability, efficiency, and User interface/user experience. The study engaged with developmental research using the mobile app development cycle, including requirement specification, development modeling, design and development, testing, and deployment. Online data gathering and analysis were used for mobile application validation, evaluation performance, and mobile deployment. A total of 95 information technology students evaluated the application. The results showed that the application is functional, reliable, usable, efficient, and the user interface is helpful. The overall results obtained a 4.20 with an excellent evaluation that shows that developing a mobile application can be a great tool in the flexible learning delivery for students due to its accessibility and usefulness.*

## KEYWORDS

*Flexible Learning, Mobile Application, Support Mechanism, Technopreneurship, User Interface.*

## 1. INTRODUCTION

Mobile phones have increased their popularity, especially among the younger generation. In Asia's developing countries, mobile phones facilitated mLearning in helping to enhance educational outcomes [1]. Smartphones and other mobile devices have great possibilities in education, given the rapid rise in smartphone ownership among younger age groups and these devices' teaching and learning benefits [2]. As a result, mobile phone technology continues its rapid development, and mobile applications have improved information access and the way we communicate and collaborate [3]. Mobile devices have evolved into a whole suite of applications, support, and assistance for educational institutions. Mobile devices can produce practical educational applications for present students [4].

Similarly, mobile phones are being used to teach and learn in the educational sector. Mobile phones are considered an integral part of college life and used overtly and covertly in a campus setting, most significantly inside the classroom. Students can access or download learning materials on their smartphones and tablets, install educational apps, and study whenever and wherever they want [5]. A smartphone is a phone and a device that can educate you with your

willingness and timing conveniently available for the user [6]. The device appears capable of contributing to student learning and improved academic performance.

Mobile devices significantly influence education and experience continuous transformation and adoption. Although using mobile phones in the classroom can be difficult, multiple studies have shown that using wireless networks and mobile applications to facilitate collaborative learning can improve educational outcomes [7].

Mobile learning is a new platform of learning through mobile technologies, and it has increased the penetration of smartphones and digital devices globally in a short interval of time [8]. There is a diverse learning opportunity for using M learning because the mobile phone is portable, has social interactivity, context sensitivity, connectivity, individuality, and affordance to people in academic or non-academic settings [9].

Likewise, mobile learning arouses interest and helps the students acquire a better understanding of other materials. Learners seemed to value those learning activities to apply learned knowledge and skills to personal situations. Mobile learning is an emerging trend that brings advantages to learners in achieving their goals [10]. M-learning converts mobile applications into more diverse and provide accurate information available according to the need of students. The learners are more comfortable downloading the app, using it according to the condition, and sharing ideas and views. M-learning allows learners to engage with the learning processes in various locations, through a range of devices, and at a time of convenience [11].

In addition, Mobile learning allows students to study, collaborate, and exchange ideas while using the internet and technology, which lead to a significant component in higher education [12]. The use of instructional apps has increased students' competencies in relational and communicative skills [13]. On the other hand, mobile learning enhances students' learning, and engagement improves communication between participants and provides authentic and situated learning. The results also revealed that mobile technologies positively change the modes of teaching and learning in the field of education, which speedup its use and implementation in the education sector [14].

Moreover, educational techniques are changing very quickly. Recent advancements in technology challenge the present educational system to develop a program that meets an ever-changing society's demands. Educational apps promote active, engaged, meaningful, and socially interactive learning [15]. Educational institutions are increasingly transitioning to mobile platforms and mobile application technology to communicate, advertise, and disseminate education-related information [16]. Educators are then obliged to prepare the students for an increasingly technological society that will require them to search for new techniques and strategies to maximize learning. The teaching model of mobile learning can help college students get a better learning experience that can significantly improve students' learning effectiveness, skill mastery, and learning enthusiasm [17].

Furthermore, Occidental Mindoro State College has implemented two learning modalities since 2020: flexible learning delivery and modular learning. Students are now using mobile phones to engage with their teachers by accessing their google classroom, video conferencing, and communicating through Facebook, email, and messenger. The use of mobile technologies to increase learning opportunities outside the school is urged by higher education teachers [19].

Finally, the Technopreneurship Mobile Application (TMA) is a great help to facilitate interactions between students and teachers in the most accessible way. Smartphones have emerged to assist both teachers and students in improving the quality of learning. The mobile

technology will be utilized as a platform in delivering the M learning modalities of students. These mobile technologies are not only helping learners to develop new media aptitudes, but they also extend the opportunity for learners and instructors to create stronger links [20].

Lastly, to help improve students' access, resources, and performance in the subject of Technopreneurship. With the Mobile application development, the students can access the lessons even with limited internet connectivity. The lessons are complete and accommodate a small amount of storage with their mobile phone which provides an opportunity to have an alternative way of reaching out to students following the availability of their resources. A mobile application environment with appropriate content promotes the students' scientific, analytical, and critical thinking abilities. User experience testing revealed how the TMA application is used, its challenges, and its process of improvement and development. The user experience is useable, helpful, desirable, and low cost [21].

### 1.1. Research Paradigm

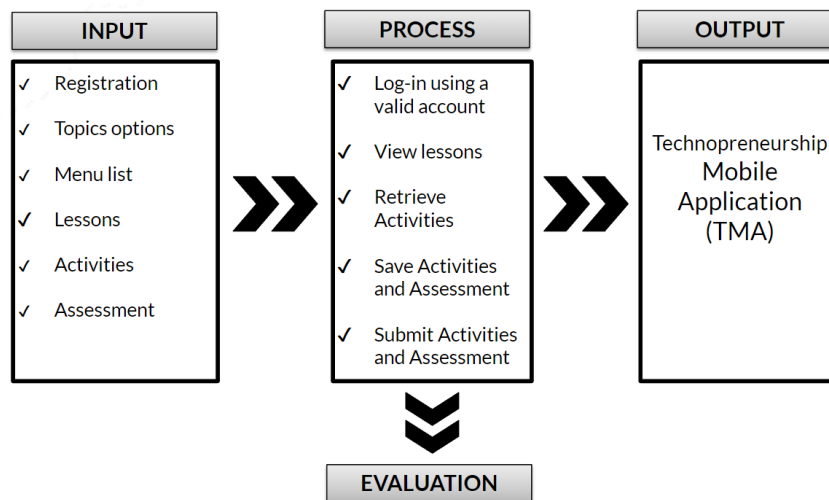


Figure 1. IPO Diagram for Users

The Input-Process-Out (IPO) diagram shows the informational and graphical representation of how data is being processed to produce results. Figure 1 shows the conceptual process of the application. TMA lets the users register in the application to have valid access. The user can only view the topics options and menus to access the lessons, activities, and assessments. The application provides an interface where users can easily access and send their tasks and activities.

### 1.2. Objectives of the Study

The study's main objective is to develop and evaluate a Technopreneurship Mobile Application (TMA): A Support Mechanism for Flexible Learning Delivery System.

Specifically, this study aims to achieve the following objectives:

1. Develop an appropriate Technopreneurship Mobile Application with the following features:
  - Well represented digital information;

- Interface interactivity;
  - Supplementary Learning Material; and
  - Online activities engagement.
2. Create a system using Android Studio (Kotlin), Visual Studio Code (JavaScript), Database (Indexed DB), and for the web interface using JavaScript, PHP, MySQL for the Database;
  3. To assess the level of acceptability of the Technopreneurship Mobile Application by the student respondents regarding its functionality, reliability, usability, efficiency, and User interface/user experience.

## 2. METHODS

### 2.1. Project Development

The Technopreneurship Mobile Application (TMA) interface considers readability, functionality, and accessibility by integrating the full-screen layout and floating navigation menu. Moreover, a floating navigation menu allows users to easily navigate the application's different functionalities.

### 2.2. System Architecture

The Technopreneurship Mobile Application (TMA) system architecture can be accessed by the students using their mobile android devices. All text, images, animations from lessons, assignments, and activities are visible. Student registration is essential, which is stored in the Learner's data. Students' outputs and activities will automatically be submitted to the teachers via cloud storage using internet connectivity.

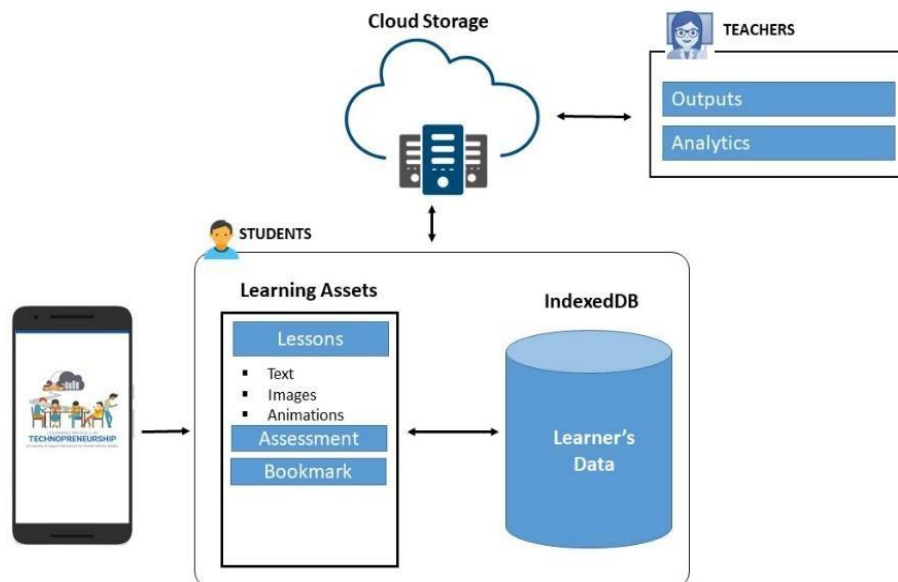


Figure 2. The Mobile Platform Architecture

### **2.3. Research Design**

The researcher uses the descriptive research method utilizing the developmental study to attain the desired evaluation of the acceptability and effectiveness of the Technopreneurship Mobile Application. This study utilizes the descriptive research method through the survey technique done using google Forms. The evaluation seeks the respondent's permission and informs them about the conduct of the research. The questionnaires used in the data gathering involved the system's development.

### **2.4. Respondents**

The respondents of this study were the ninety-five (95) Information Technology students who are currently enrolled and joining online classes. The application was developed for the students to access the module in Technopreneurship easily.

### **2.5. Instrument**

The proponents used online survey questionnaires to collect the necessary information from the respondents of this study. The questions in the survey were divided into five criteria, namely: (1) Functionality, (2) Reliability, (3) Usability, (4) Efficiency, (5) User Interface/User Experience, which were then subdivided into three questions per criteria. The questionnaire used the Likert scale format, where respondents rated the app, five being the highest and one being the lowest. The respondents prepared a google form to select an option from the given criteria easily. The survey questionnaire was presented clearly and only required the respondents to choose an option corresponding to their rating score. Furthermore, the respondents wrote comments or suggestions about the application's accuracy and execution.

### **2.6. Data Gathering Procedure**

The following sections explain the evaluation results of the students of BSIT 1st year (AY 2021-2022) of Occidental Mindoro State College, particularly from Bachelor of Science in Information Technology.

## **3. RESULTS**

### **3.1. Mobile Application Development Life Cycle**

The study is created following the mobile application development life cycle. Figure 3 shows the software's components from requirements specification, development modeling, design and development, and testing and deployment. The requirement specification is identified based on the students' availability of resources currently used. The navigation and functional requirements of the software are under the student's capabilities. Identifying its purpose, needs, context, and content is essential to achieving the project objective. High quality of service (QoS) and minimal latency is required for real-time mobile applications such as online gaming, audio/video conferencing, and financial transactions [22].

After analyzing and identifying the requirements, the AGILE development model is suited for this application. At the same time, the design includes the software's interface, including its navigational functionality. The development focuses on customizing the software with proper coding, database, and web application integration without any errors. The testing includes the

participation of the faculty and students to analyze if the software is error-free. Finally, the deployment consists of utilizing the software for student engagement.

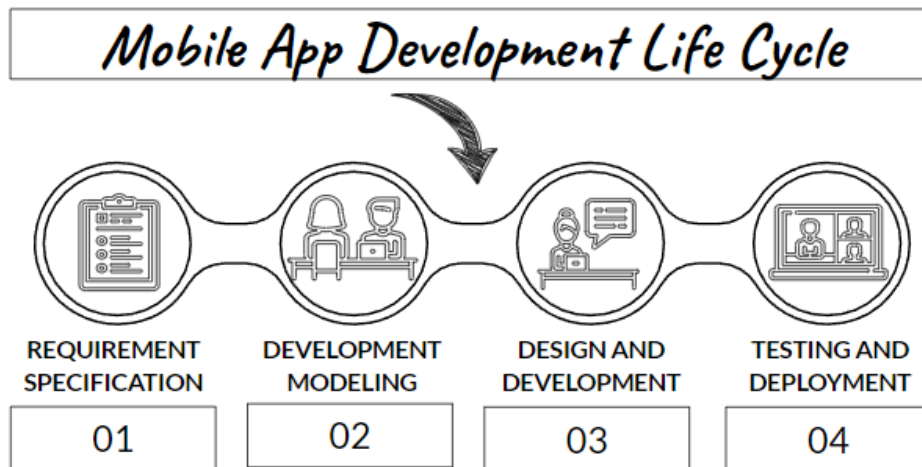


Figure 3. Mobile App Development Life Cycle

### 3.2. Software Suited for Development

#### Android Studio 4.1.3 (Kotlin)

The Android Studio is considered the fastest tool for building apps. With world-class code editing, debugging, performance tooling, a flexible build system, and an instant build/deploy system, developers can focus on building unique and high-quality apps. The proponents decided to use Android Studio since it is proven to make solely on the development of apps for Android devices, and it is also free of charge. In addition, the proponents have the fundamental knowledge needed in using the JavaScript programming language in developing the application.

#### Visual Studio Code

Visual code support development operations with a streamlined code editor provide quick code-build-debug cycle tools. The proponents used visual studio code because of its scripting tools, support, source code editor, functional syntax, auto-indentation, box-selection, snippets, and bracket-matching. Furthermore, it has built-in support for IntelliSense code, semantic code, navigation, and code refactoring. In addition, the interactive debugger is handy for writing the source code.

#### Database (Indexed DB)

The use of the database in creating programs is essential in storing data. In addition, the indexed DB allows for applications to design, store and manipulate objects. The proponents used indexed DB because it is intended for offline apps and is more powerful than local storage because it is built into a browser that stores multiple types of keys and values. In addition, it has transaction supports for reliability, queries, indexes, and more significant volumes of data.

## MySQL

MySQL is based on SQL – Structured Query Language and is considered a relational database management system. The proponents used this as a web database to store students' activities and to be able to access by the instructors online, and it has a flexible programming environment. In addition, it is helpful because relational database stores data in separate tables, organized into physical files.

### **3.3. Programming/Scripting Language**

#### PHP

PHP is considered a general-purpose scripting valuable language in developing dynamic and interactive websites. PHP's fast and secure feature has tools and frameworks to fix vulnerabilities. In addition, the proponents considered this easy to learn and use because of its simple syntax and command functions. The web-based application for the instructors was created using PHP. Another consideration is that it's open-source, free of charge, and has more extensive support from a wide range of communities.

#### JavaScript

JavaScript, often abbreviated as JS, is a cross-platform, object-oriented, and high-level scripting language. It is considered a core technology of the World Wide Web and is commonly used to create interactive web pages. Initially, JavaScript was designed to be a browser-only language, but nowadays, it is used in many other environments because of its dynamic and straightforward syntax. One of the features of mobile applications is the capability of the students to send their activities to their instructors. The proponents implemented the program coding to accomplish this feature, wherein it used JavaScript as its scripting language.

### **3.4. Algorithm Implementation**

Technopreneurship Mobile Application (TMA) can be accessed by students using their mobile phones. The lessons can be read and viewed by the students. They can answer activities or assessments provided by the instructors, which they can submit directly online once they have internet connectivity; otherwise, they can save it on their local database, as shown in figure 4. PHP and JavaScript were used to create the application's content. In contrast, the indexed DB and MySQL for the database help in processing systems made and integrated to handle data and processes that are continuously changing.

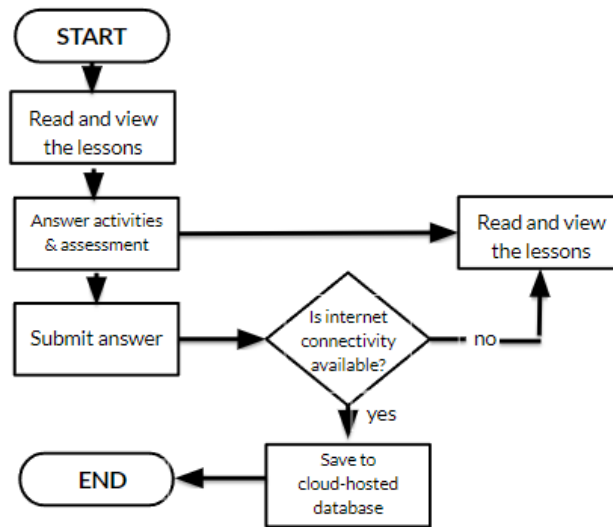


Figure 4. Program Flowchart for Algorithm Implementation

### 3.5. Mobile Application Evaluation

The respondents evaluated the mobile application's functionality, reliability, usability, efficiency, and user interface/user experience. There were 95 randomly selected students who assessed the software.

Table 1. Level of acceptability of the Technopreneurship Mobile Application as assessed by the user

Level of acceptability	Mean	Descriptive Rating
1) Functionality	4.21	Highly Acceptable
2) Reliability	4.18	Highly Acceptable
3) Usability	4.20	Highly Acceptable
4) Efficiency	4.16	Highly Acceptable
5) User Interface/User Experience	4.27	Highly Acceptable
<b>GRAND MEAN</b>	<b>4.20</b>	<b>Highly Acceptable</b>

Table 1 shows the Technopreneurship Mobile Application (TMA) results for students. The respondents obtained excellent evaluation on the application as overall results on the five different criteria used. The mean score of 4.21 for the application's functionality is highly acceptable, and the results prove that the application is essential with effective coding capabilities. The reliability has a mean score of 4.18, utilizing the application without error. The respondents considered the application usability great help navigating with 4.20 because of its comfort and convenience. The software efficiency achieved an overall mean of 4.16, signifying that the software is beneficial. Finally, the user interface and user experience obtained an overall mean of 4.20. The result proves that the software is easy to use and enjoyable for the students. The overall results of 4.20 demonstrate that the mobile application is excellent in providing informative information about technopreneurship.

Furthermore, the summary of mobile application evaluation results shows that user interface and user experience got the highest mean of 4.27 and were interpreted as excellent with functionality and usability with a mean of 4.21 and 4.20. At the same time, the reliability (4.18) and efficiency



(4.16) were considered good. Therefore, the software is a useful mobile application in flexible learning delivery that helps students interact, communicate, share information and resources.

#### 4. CONCLUSIONS

In conclusion, the proponents were able to meet their research requirements. They made the application function well regarding access and easy utilization of the students with the Mobile Application on Technopreneurship. As a result, TMA got positive results in the evaluation conducted involving the Information Technology students. The application could view lessons and activities most conveniently, and they can answer and send their activities using the mobile app.

TMA was able to help students and faculty to easily communicate about the lessons interact with the images, buttons, and navigation tool. The search feature with easy access to the lesson makes it easier to use. The proponents conceptualized the application to be easy to understand. Most respondents agreed that they could quickly learn how the application works and use it without much effort. The application is helpful for students in the delivery of flexible learning engagement. The students can easily view the lessons at any time, even without internet connectivity. The review function works positively, where students can submit their tasks online.

#### ACKNOWLEDGMENTS

The authors would like to thank the Occidental Mindoro State College Administration, College of Arts, Sciences, and Technology faculty, students, families, and friends.

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