Design and Implementation of a Mobile Application for Project Assessment and Presentation for Tertiary Institution

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Article information	Abstract
	The use of mobile applications (apps) has become popular in recent times due to its usefulness in several areas of everyday life such as communication, social media, shopping, banking, and education. With increasing interest in making educational activities such as learning and communication between students and academic staff (lecturers) as easy and convenient as possible, software developers have designed and implemented different mobile apps to address specific academic activities. This paper focuses on designing and implementing a mobile app for tertiary institution project assessment and presentation. The proposed mobile app encompasses features that facilitate project submission, peer review, and instructor's assessment thus fostering a collaborative and technologically enriched learning environment. The mobile app was developed using the iterative waterfall model with the implementation phase leveraging contemporary mobile app development frameworks and methodologies in other to realize the desired designed features. Preliminary results obtained from the mobile app testing and usage by a sampled group indicated improved efficiency in project evaluation, increased student engagement, and a positive impact on the overall learning experience.

1. Introduction

The use of mobile applications also referred to as mobile apps has become highly pervasive in recent times. A mobile app is an application software designed to run on a mobile handheld device such as a smartphone, Android device, tablet [1], or computer. It is usually developed to serve as an interface to the standard application [2]. The importance of mobile apps in mobile devices is undeniably unending as their application spans several areas of everyday life and activities such as communication, education, cooking, social media, shopping, business, banking, and a lot more. Whatever its application area, mobile apps generally have some common features which include analytics, content display, in-app messaging, location services, navigation and search, offline access, push notifications, security, settings and preferences, social media integration, user authentication and user profile. Regarding its application in education, it is used for tertiary teaching and research by academic staff and undergraduate students [3]. This has become necessary especially when students have to share their research work in the form of a thesis with an academic

staff (supervisor). Previously, this type of communication was done using printed papers, which has become inconvenient and exhausting. The use of mobile apps in sharing, preparing, and assessing students by their project supervisors has proved to be time-saving, economical, and convenient. In line with these benefits, this paper focuses on the design and implementation of a project assessment and presentation mobile application for tertiary schools.

Several researches have been conducted in the designing and implementation of mobile apps for its various areas of applications. An overview of the key themes, trends, and significant contributions in the field of app development are as discussed below.

In 2022, [3] conducted a survey that was made available to staff and higher-degree students (collectively referred to as academics) across the University to capture their perspective on mobile app use for teaching and research. The report talked about how a survey was available to staff and higher degree students across the university to capture their perspective on mobile application use for teaching and research. [4] performed a comparative demonstration and Analysis of File Sharing Applications on Android Mobile Devices. The research was focused on the file-sharing applications running on smartphones specifically Android mobile devices. Demonstration was performed by conducting file sharing on an Android mobile device using mobile file sharing applications by transferring all types of files such as single small files, single big files, and multiple small and big files to compare the file transfer rate among these file sharing applications. Different analysis was performed focusing on ease of access and compatibility and the results obtained were presented.

[5] study focused on the application of the design science research approach in the development of a mobile learning application called MobileEdu for computing education in the Nigeria higher educational context. It described analysis, design, and implementation activities related to the development of MobileEdu and also deliberated on the characteristics and scope of its adherence to the traits and ideas of design science research. The design was evaluated in a real-life learning setting, through an experiment conducted with 142 third-year undergraduate students in a Nigerian university. [6] proposed an implementation of a mobile application-based P2P learning system that was named "EachOther". The implementation scenario is on students of an IT course at the High School of Technology of Fez (ESTF). The study focused on the conception, development, and implementation of a mobile application based on an Android system to support collaborative learning, through the application of object-oriented modeling language which is Unified Modeling Language (UML). [7] designed a seamless file-sharing application for Android devices. In this study, it was concluded that the application could be a solution for frequent disconnection of P2P file sharing in mobile devices. Since SFS doesn't use the server, there were no additional communication costs. It was said that all users need a simple operation done by themselves. This improved the limitation of devices such as low battery or lack of capacity. [8] designed, developed, and presented two applications to support students learning in the Greek secondary education environment. The structure and functions of the two applications were presented under the names "Aepp_App" and "CS_App". The mobile applications were intended for use by teachers and students during a lesson as well as outside the classroom setting, with the use of Android mobile devices. [9] implemented a P2P file-sharing system which showed that a P2P file-sharing system between mobile devices can be designed and implemented using Bluetooth as a communication protocol. The application allows J2ME and MIDP (Mobile Information Device Profile) enabled mobile devices to share and publish the files in the network over Bluetooth, search for specific types of files such as (music, pictures, text, and programs) and download them onto their local memory. It is possible to develop the system in the future, to add more features and the capacity to work on more than one operating system for mobiles.

[10] provided an overview of previous studies conducted on mobile learning applications and investigated the challenges and difficulties of the design and development of mobile learning applications. To have a better understanding of implementing a mobile learning application, a prototype of one mobile learning application was developed to educate and enhance motivation among adults to donate specific necessities for underprivileged students. [11] designed and implemented a mobile application to disseminate students' results of their examinations using Java programming language, Phased model as Software Development methodology, and Android technology. The study obtained it's through documentation, interview, and observation techniques. [12] developed a mobile application to simplify the learning process in secondary and high schools. The mobile application was developed on the Andriod operating system given the extensive use of mobile devices and a convenient application development toolkit. The mobile application is meant to simplify the acquisition of information required for an effective educational process. A pedagogical experiment was conducted as part of the study at the S. Toraighyrov Pavlodar State University.

The review of the literature shows that several mobile applications have been developed to address many educational activities such as learning, disseminating student results, and file sharing. However, none addressed the assessment and presentation of the documents that are been shared between students and the academic staff (supervisor). Hence, this study will address that gap.

2. Materials and Methods

The mobile app developed in this study is called Project Assessment and Presentation Application (PAPA). As the name suggests, it is useful in sending, receiving, assessing, presenting, and reviewing project works. This study employed the use of several materials listed in the sub-section below that were interfaced together to develop the mobile app.

2.1   Materials Used for the Design
The materials required for the design include both hardware and software. The hardware materials included the following:
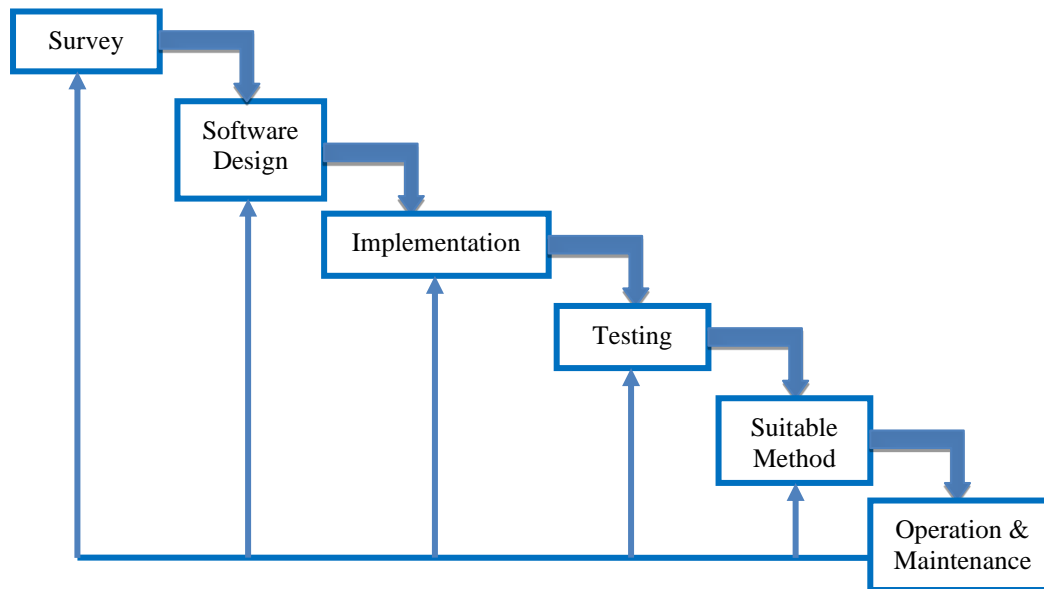
    a. smartphone (android)
    b. laptop computer (Intel x86 CPU, 2 GB RAM, Core i5)
    c. router

The software required are:

    a. C++
    b. Java
    c. Kotlin
    d. React Native
    e. Java Script
    f. Redox
    g. XML
    h. SDK
    i. Node JS
    j. Firebase
    k. Typescript

2.2   Method for the Design
The method employed in implementing this design followed the Iterative Waterfall method as shown in Figure 1.


Figure 1: Iterative Waterfall Method

The two key approaches are survey and experimental (software design, implementation, testing, suitable method, operation and maintenance). For the survey approach, a total number of 22 questionnaires were distributed among 19 students and 3 academic staff to obtain insights on the expected design and operational requirements for the implementation of the proposed mobile app. The questionnaire as presented in the Appendix was divided into four sections namely; to obtain user information, user's experience, presentation of results, and overall satisfaction and recommendations. The analysis of the different responses from all the respondents then formed the basis on which the decision of the design and operational requirements for the proposed mobile app was made.

The experimental approach involves the development of the mobile app which began with putting together designs and ideas. A rough sketch of the design architecture was made to assist in the implementation of the mobile app. Next, was the implementation of the design which involved the interfacing of various materials such as a laptop, a smartphone (android), and a router. The laptop was used to design and write codes necessary for the smooth operation of the app. The router provided active internet connectivity during the app development. The implementation stage was followed by testing which is necessary to identify and rectify any errors made during the building of the mobile app.   This is to ensure glitch-free operation and to promote the quality of the mobile app. A suitable method was then selected for the development of the mobile app. This process was followed from planning to creating, to testing, and then picking the best method for designing the mobile app. Lastly, there is the operation and maintenance stage which makes sure that the mobile app is ready for use and is in good condition for it to be released to the public.

**2.3   Framework for the Developed Mobile App**
The developed mobile app has a framework that describes how the mobile app works as shown in
Figure 2.
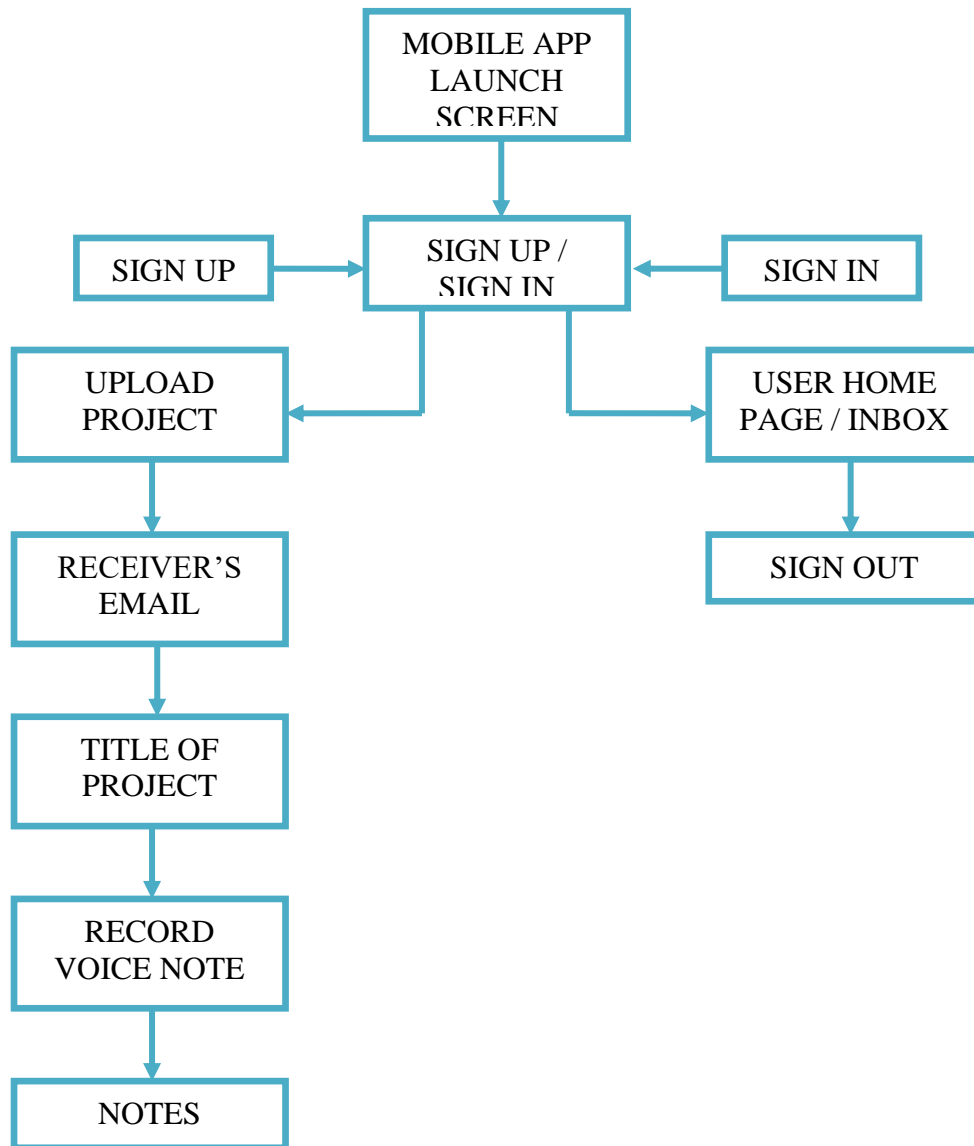
Figure 2: Framework of the Mobile App (PAPA)

The mobile app allows users to perform several functionalities such as uploading/sending a project
by inputting the required email to which the project would be sent. The user can also receive projects
from other users by checking the inbox located on the first page of the mobile app. The mobile app
also allows the user to send notes or comments about the project for assessment, corrections, and
feedback, as well as sending voice notes which is achieved via clicking or tapping on the voice
recorder.

The flowchart for the algorithm operating in the mobile app is presented in Figure 3.
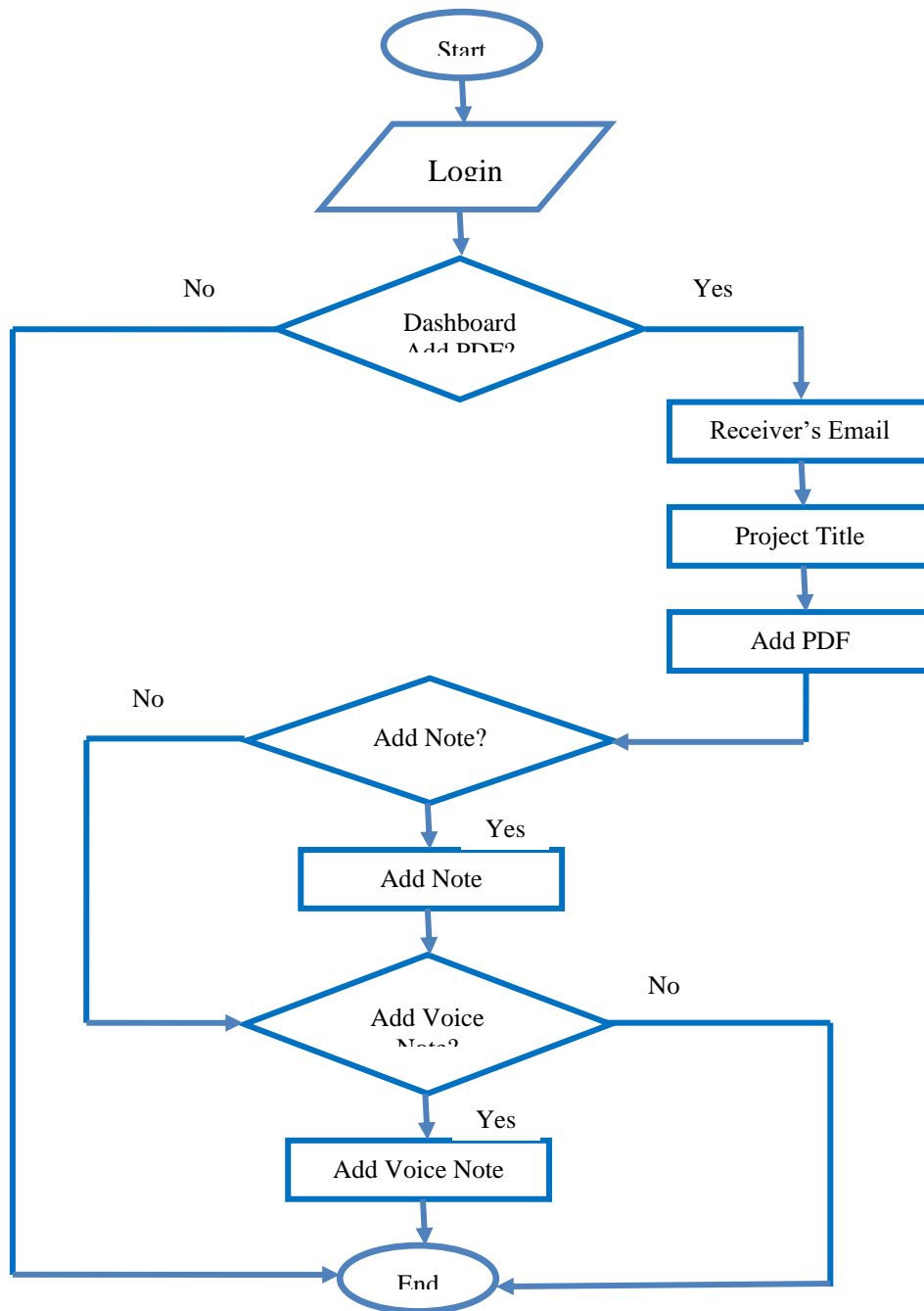
**Figure 3: Flowchart for the Algorithm Operating in the Mobile App (PAPA)**

The sequence of the developed algorithm for the PAPA mobile app is as presented:

1. Start the mobile app by clicking on the app icon
2. Login via Google
3. Dashboard
4. Click on the "Add" icon
5. Enter the receiver's email address
6. Enter the title of the project to be sent
7. Add a PDF file from your device by clicking the "Add PDF" button

8. Add notes, this is especially necessary when corrections are to be made to the PDF report.
9. Or add a voice note, for ease of communication
10. Click the submit button

3. Results and Discussion

The result obtained from the design and implementation of the developed PAPA mobile app was achieved mainly through testing. All the individual features of the mobile app which included project creation, project editing, voice note recording, and sending and receiving of PDF files were tested and all passed the functional tests without any major issues as shown in Figure 4 and Figure 5.
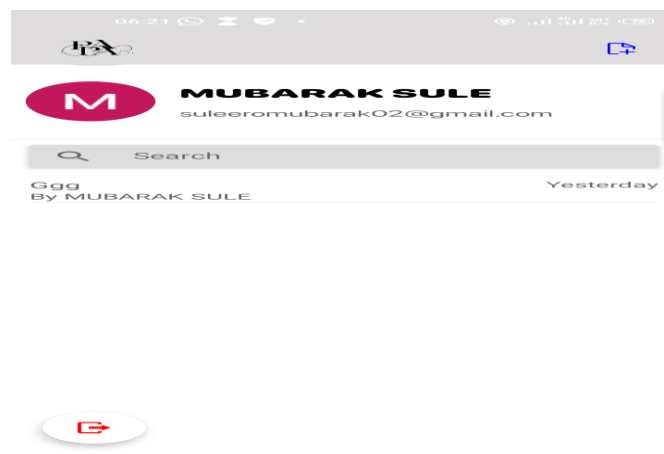
Figure 4: User / Inbox Page for the Mobile App (PAPA)
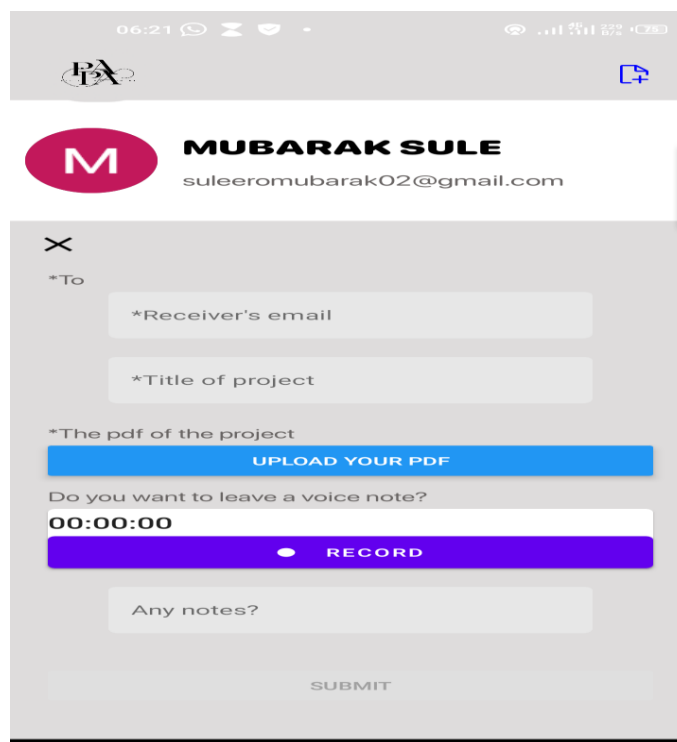
Figure 5: Upload Page for the Mobile App (PAPA)

Next, a sample group of students and academic staff (project supervisors) were allowed access to the developed mobile app. The feedback obtained from the sampled users proved that the developed mobile app is intuitive and easy to navigate.   However, minor usability improvements were suggested and implemented, including a simplified login process and clearer guidance for creating, sending, and assessing project reports. Overall, the sampled users expressed satisfaction with the developed PAPA mobile app performance and features.

4.   Conclusion

This paper focused on the design and implementation of a project presentation and assessment mobile app. This mobile app which was called PAPA has been analyzed and tested on multiple Android devices and Android operating systems to ensure it provides the most reliable and efficient way of sharing, presenting, and reviewing school project work. The result obtained from the testing phase confirmed the functionality and usability of the mobile app, with minor issues identified during testing and user acceptance testing addressed promptly, resulting in an improved user experience. The mobile app is ready for deployment in educational institutions, where it will streamline the process of project assessment and presentation and enhance the learning experience for students.

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Appendix

QUESTIONNAIRE

Introduction:
Thank you for participating in this survey. Your feedback is valuable to us as we strive to improve our project assessment and presentation mobile application. Please take a few minutes to answer the following questions honestly and thoughtfully.

Section 1: User Information
Name [Optional]: …………………………………………………………………………………..
Age: …………………………………………………………………………………………….....
Gender: ……………………………………………………………………………………………
Occupation: …………………………………………………………………………………………

Section 2: User Experience
Q. How often do you use project assessment and presentation tools?
1. Daily
2. Weekly
3. Occasionally
4. Never

Q. Which features of a project assessment and presentation mobile application are most important to you? (Select all that apply)
1. User-friendly interface
2. Navigation
3. Simplicity
4. Offline access
5. Security features
6. Others (please specify): ………………………………………………………………………

Q. On a scale of 1 to 5, how satisfied are you with the current project assessment and presentation mobile applications you have?
1 - Very Dissatisfied
2 – Dissatisfied
3 – Neural
4 – Satisfied
5 - Very Satisfied

Q. What improvements or additional features would you like to see in a project assessment and presentation mobile application?
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Section 3: Presentation of Results
Q. On a scale of 1 to 5, how important is it for you to be able to share and present your project assessments and results to others?
1. Extremely important
2. Very important
3. Moderately important
4. Slightly important
5. Not important.

Q. Have you encountered any challenges when presenting project assessment results using mobile applications? Yes [ ], No [ ]
If yes, please specify.
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Section 4: Overall Satisfaction and Recommendations
Q. On a scale of 1 to 4, how likely are you to recommend our project assessment and presentation mobile application to others?
1 - Not Likely
2 – Neutral
3 – Likely
4 - Very Likely

Q. What improvements do you suggest to make our project assessment and presentation mobile application better?

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Q. Any additional comments or feedback you would like to provide:

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Thank you for taking the time to complete this questionnaire. Your input is highly appreciated.

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