

E-LEARNING: A MOBILE APPLICATION

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

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This project title “E-Learning: A Mobile App” submitted by **Md. Barkatullah, ID No:181-15-11343** and **Mollika Zaman Mohna, ID No:181-15-11109** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 05.01.2022

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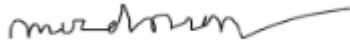


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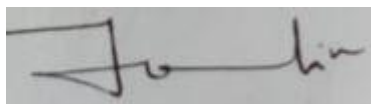


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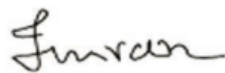


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We hereby declare that, this project has been done by us under the supervision of **Saiful Islam, Lecturer (Senior Scale), Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

Nowadays, people are using android apps more frequently. Many types of smart android apps actually creating our life more leisurely day after day. We are building this android-based project to help teachers and students for study purposes. Teachers will be able to teach very easily through this application anytime. Students will be able to continue their studies very easily. That's why we came up with a user-friendly e-learning application project. User-friendly features for teachers and students. Our task was developed with Back-end: Native JAVA, Array Adaptor, Google Console API and Front-end: Linear Layout, Relative Layout, Scroll View, Image View, Card View, Splash Screen, Recycle View. Teachers will be able to take classes online, students will be able to join online classes. Teachers can take online attendance, exams, assignments. Teachers will be able to keep class recordings, students will be able to watch that recorded video later. Developing this project will save the user time and avoid all kinds of unnecessary hassle.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This project is an android-based application. Nowadays our education is mainly online-based. So, our app is for the purpose that students can easily study online. With this app they are will get good service for their study. In this digital era, all of us want to lead our work digitally. We execute this project to ensure teachers and students get the most effortless way to take their class and examination and use other services. This project will help them more than usual. Such a program is vital for Bangladesh so that individuals will be positive about smart apps. These days, individuals favor android-based applications because many people utilize savvy gadgets like tablets, mobile phones, workstations, and so forth to move toward the smart online application. It can raise standards and widen participation in learning. It cannot replace teachers and lecturers, but alongside existing methods it can enhance the quality and reach of their teaching. It can enable every learner to achieve his or her potential, and help to build an educational workforce empowered to change. It makes possible a truly ambitious education system for a future learning society. In this project, the main task is we made a smart application, and it will make students and teachers connected, they do their class and take the examination by app and also they will get many benefits.

1.2 Motivation

We know that it's hard for users to choose the best application to use these services nowadays. We see many students and teachers who didn't find an accurate application for their study and teaching. Many times it is not possible to go to the educational institution to take classes, then he can take classes at home if he wants. This is an abuse of our time and hard to avow the thing. It is possible to take online classes from anywhere, not just at home. Students can participate in the exam sitting at home. We want to reach every student and inspire them to use this smart project. Using this project, they will be able to manage all the activities of their education efficiently.

1.3 Objectives

It is an android-based project with a user-friendly interface and gives the most ideal alternative to the user. The apps will permit students and teachers to see the information about classes, results, any announcements of institutions, and any problems of students. We will give the

approved usefulness of our task from specific highlights to this current framework where private associations and others can view. We will make sure that all of our users get the correct info within a short time and browse easily in our smart apps. We will check every time if there are any bugs available or not. We will provide all kinds of teaching services in our e-learning application.

1.4 Expected Outcomes

Our users will get information about their classes, exams which teachers will update. They can easily browse our application. In our country, students are getting rapidly subject to android-based services. In the present circumstance, a great deal of smart applications has been set up in our country. Numerous mobile apps are leading their exercises with a decent standing. Be that as it may, large numbers of these users face problems. We will try to always give the best services to our users. We updated all the info so that our user doesn't face any issues. So, by using this smart app, users will quickly know about their classes and others information.

1.5 Project Management and Finance

To run the system smoothly, every system requires maintenance. And to bear maintenance costs it requires money. But as it is a non-profit app, the maintenance cost and other costs depend on public donation. We hope that people will be encouraged to donate to us in order to keep the system running.

1.6 Report Layout

- Chapter 1: contains an overview of the introduction, motivation, objective, expected outcome, management, and finance of this project.
- Chapter 2: analysis of the background, related works, and challenges.
- Chapter 3: requirements specification like use case diagram, business case modeling, and logical data model and, requirements analysis for this project.
- Chapter 4: design and components that were used to deploy in this project.
- Chapter 5: front-end implementation and back-end implementation as well as the testing process of this project.
- Chapter 6: contains the impact on society and the environment of this project as well as describes this project's sustainability and ethical aspects.
- Chapter 7: contains the conclusion of this project along with what improvement can be done with the project in the future.

CHAPTER 2

BACKGROUND

2.1 Preliminaries/Terminologies

“E-Learning” is a mobile application for online education purposes. This application is designed for those people who are teacher and students. Available applications on the internet for education, all have some limitations. None of them are suitable enough or user friendly for Bangladeshi users.

The goal of “E-Learning” is to provide an easy way to help teachers and students in their studies. Our application will not only ensure the educational purpose for all but will also facilitate communication with teachers and students.

2.2 Related Works

In our country as well as over the world, there are so many education-based applications. Especially in our country, most of the educational applications are made for their own institutions. There are some educational applications too. But they are not user-friendly enough and not the most convenient. Here we have combined all kinds of features and made it more user-friendly and efficient to make the e-learning process super easy and convenient.

2.3 Comparative Works

“E-Learning” is different from other education-based apps. It is designed for only study purposes. We've tried to make it more user-friendly so that more users get involved with online learning. We have added many features so that students can get all the information through this app without going to the institution. And those are made this app different from others.

2.4 Scope of the Problem

"E-learning" seeks to change the way education works. Most of the students have dropped out of school due to the epidemic. So, our application will make them interested in reading again.

While our system has many advantages, it also has some disadvantages.

- As anyone can register, so no scope to identify insidious activities.
- No online classes.
- There is no attendance system.

Our application promises to address all mentioned issues and figure out the solution.

2.5 Challenges

We know that users in our country are not getting progressively influenced to use this smart of apps. A lot of user deal with specific exceptional issues when they try to use smart classroom. Our primary target is to make easier and simple methods to serve the user, and they will effectively encourage others to use smart apps. We hope that this framework will benefit many users, and we have attempted to make our framework interface simple to utilize.

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 Business Process Modeling

We're developing this project which is presently at the highest point of interest. We created this app with the goal of preventing epidemics or any other situation. Students are very confused right now about their study. By making this project, it will help teachers and students. Both of them users will get more services through this platform.

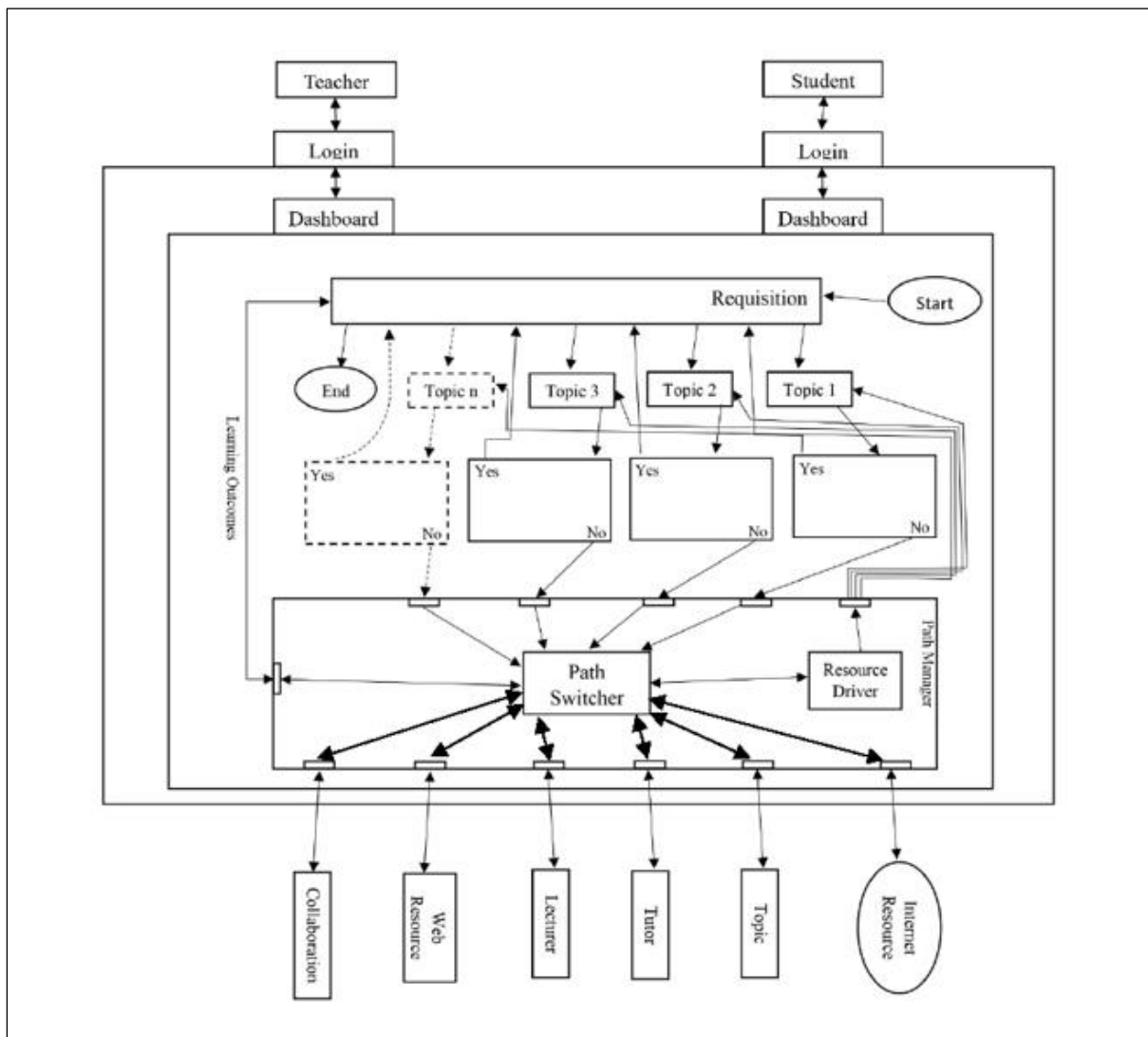


Figure 3.1.1: Business Process Model of E-Learning

In figure 3.1.1, we distributed the scenario of our features. In teacher dashboard option, we use profile, class, routine, exam, announcement, result. Students can inform about the class, class routine, exam, announcement and result.

3.2 Requirement Collection and Analysis

To gather the requirements for our project we have followed a lot of techniques. According to the requirements-

- i. At first, we have collected the data regarding this project which helps us to understand why this kind of project needed in our society.
- ii. Then, in the facilitated session, we have analyzed the features for our application.
- iii. Thirdly, we have prepared a questionnaire to identify the requirements for this kind of application.
- iv. Fourthly, another session was arranged to find out the critical issues of this app.
- v. Finally, we did prototyping to understand the output.

3.3 Use Case Modeling and Description

The use case model for the following application is-

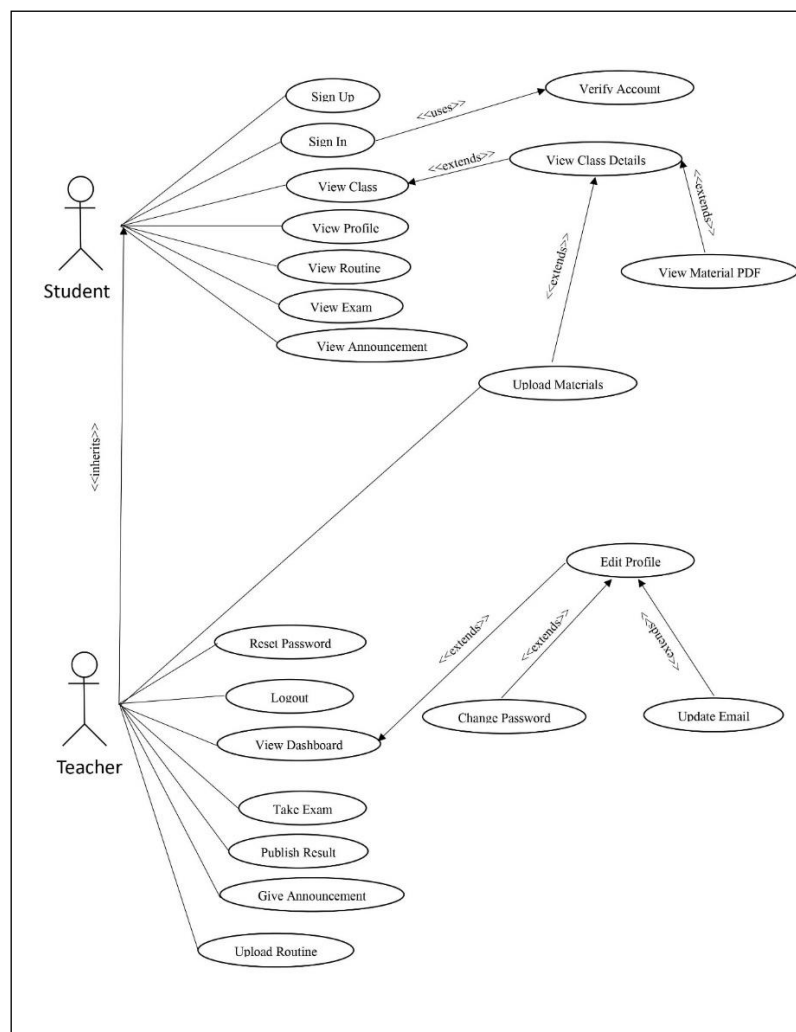


Figure 3.3.1: Use Case Diagram of E-Learning

The use case description for the following use case-

Table 3.3.1: Use case description for Sign Up

User Case	Sign Up
Description	New users will create a new account here.
Actor	Student, Teacher
Pre-condition	Users must be authenticated
Primary Path	User Name, Phone, Email, Password, Confirm Password
Exceptional Path	Can't sign up if there is no internet connection.

Table 3.3.2: Use case description for Sign In

User Case	Sign In
Description	User can sign in their registered account.
Actor	Student, Teacher
Pre-condition	Must be registered account.
Primary Path	Verified account.
Exceptional Path	Can't sign in without verified account.

Table 3.3.3: Use case description for View Class

User Case	View Class
Description	Registered accounts can view the class. Teacher and student both of them can view the class.
Actor	Student
Pre-condition	Must be registered account.
Primary Path	View class details, View class PDF
Exceptional Path	If no pdf upload, no class pdf will be shown

Table 3.3.4: Use case description for View Profile

User Case	View Profile
Description	User can see profile
Actor	Student, Teacher
Pre-condition	Registered account
Primary Path	Profile details
Exceptional Path	Without registered account, no profile will be shown

Table 3.3.5: Use case description for View Routine

User Case	View Routine
Description	User can see routine image.
Actor	Student
Pre-condition	Registered account
Primary Path	View routine image
Exceptional Path	Without registered account, no routine image will be shown

Table 3.3.6: Use case description for View Exam

User Case	View Exam
Description	Users can see exam question paper.
Actor	Student
Pre-condition	Registered account
Primary Path	View exam question paper
Exceptional Path	Without registered account, no question paper will be shown

Table 3.3.7: Use case description for View Announcement

User Case	View Announcement
Description	Students can notify if there are any kind of announcements
Actor	Student
Pre-condition	Registered account
Primary Path	View notification
Exceptional Path	N/A

Table 3.3.8: Use case description for Reset Password

User Case	Reset Password
Description	If the user forgets the password then the user can recover password.
Actor	Teacher, Student
Pre-condition	Registered account
Primary Path	Enter new password, Confirm new password, Save
Exceptional Path	N/A

Table 3.3.9: Use case description for Logout

User Case	Logout
Description	User can logout their registered account.
Actor	Student, Teacher
Pre-condition	Registered account
Primary Path	View routine image
Exceptional Path	Without registered account, no routine image will be shown

Table 3.3.10: Use case description for View Dashboard

User Case	View Dashboard
Description	Registered accounts can view the dashboard.
Actor	Student, Teacher
Pre-condition	Must be registered account.
Primary Path	Edit profile, Change password, Update Email
Exceptional Path	N/A

Table 3.3.11: Use case description for Take Exam

User Case	Take Exam
Description	User can take exam
Actor	Teacher
Pre-condition	Registered account
Primary Path	Upload exam paper
Exceptional Path	N/A

Table 3.3.12: Use case description for Publish Result

User Case	Publish Result
Description	User can publish result pdf.
Actor	Teacher
Pre-condition	Registered account
Primary Path	Upload result
Exceptional Path	N/A

Table 3.3.13: Use case description for Give Announcement

User Case	Give Announcement
Description	Teacher can notify users if there are any kind of announcements.
Actor	Teacher
Pre-condition	Registered account
Primary Path	Give announcement for students.
Exceptional Path	N/A

Table 3.3.14: Use case description for Upload Routine

User Case	Upload Routine
Description	User can upload class routine.
Actor	Teacher
Pre-condition	Registered account
Primary Path	Upload routine for students
Exceptional Path	N/A

3.4 Logical Data Model

E-R diagram helps a developer to get a complete view of the database. The used E-R model for our system-

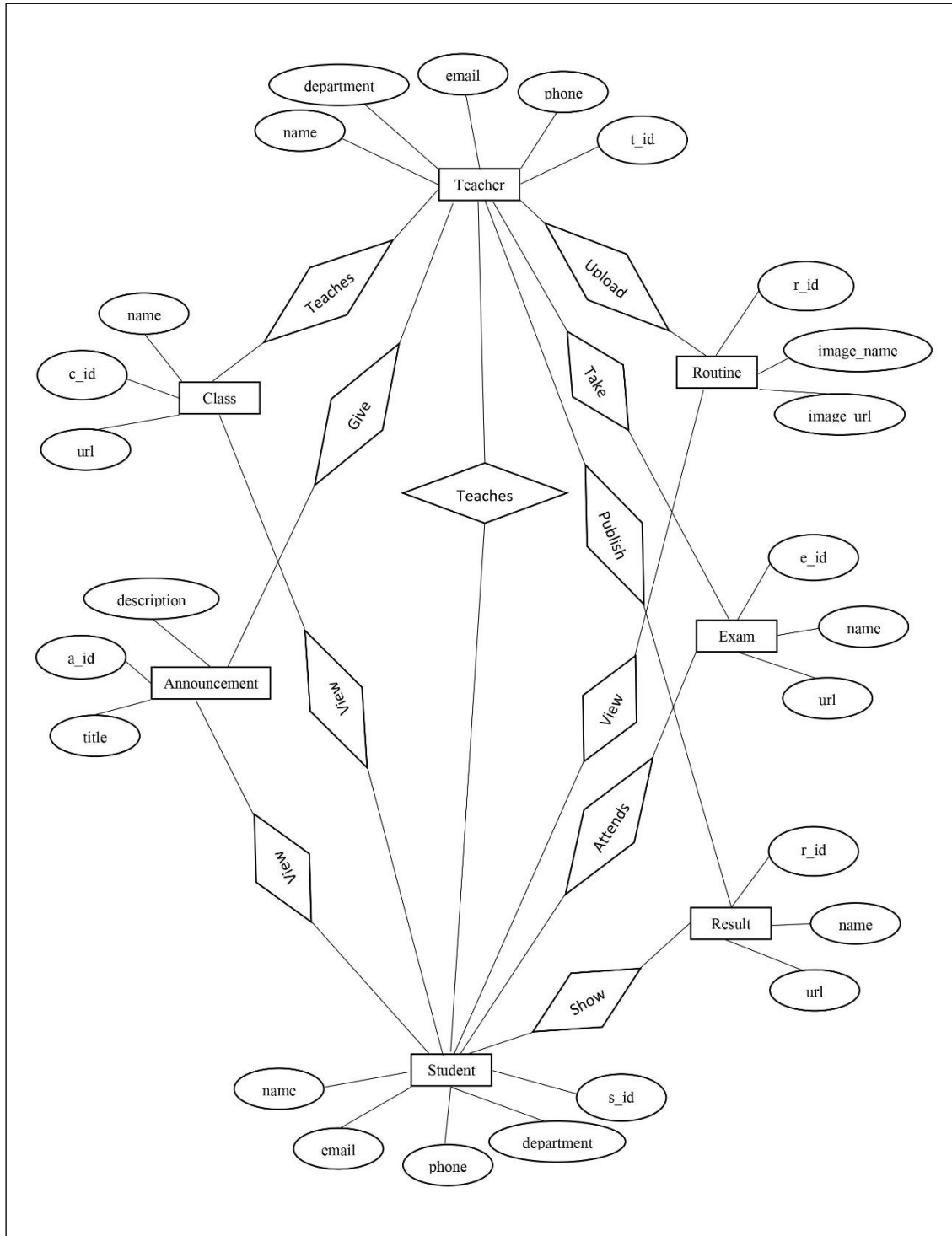


Figure 3.4.1: E-R Diagram for E-Learning

3.5 Design Requirement

The working procedure of our project is given below-

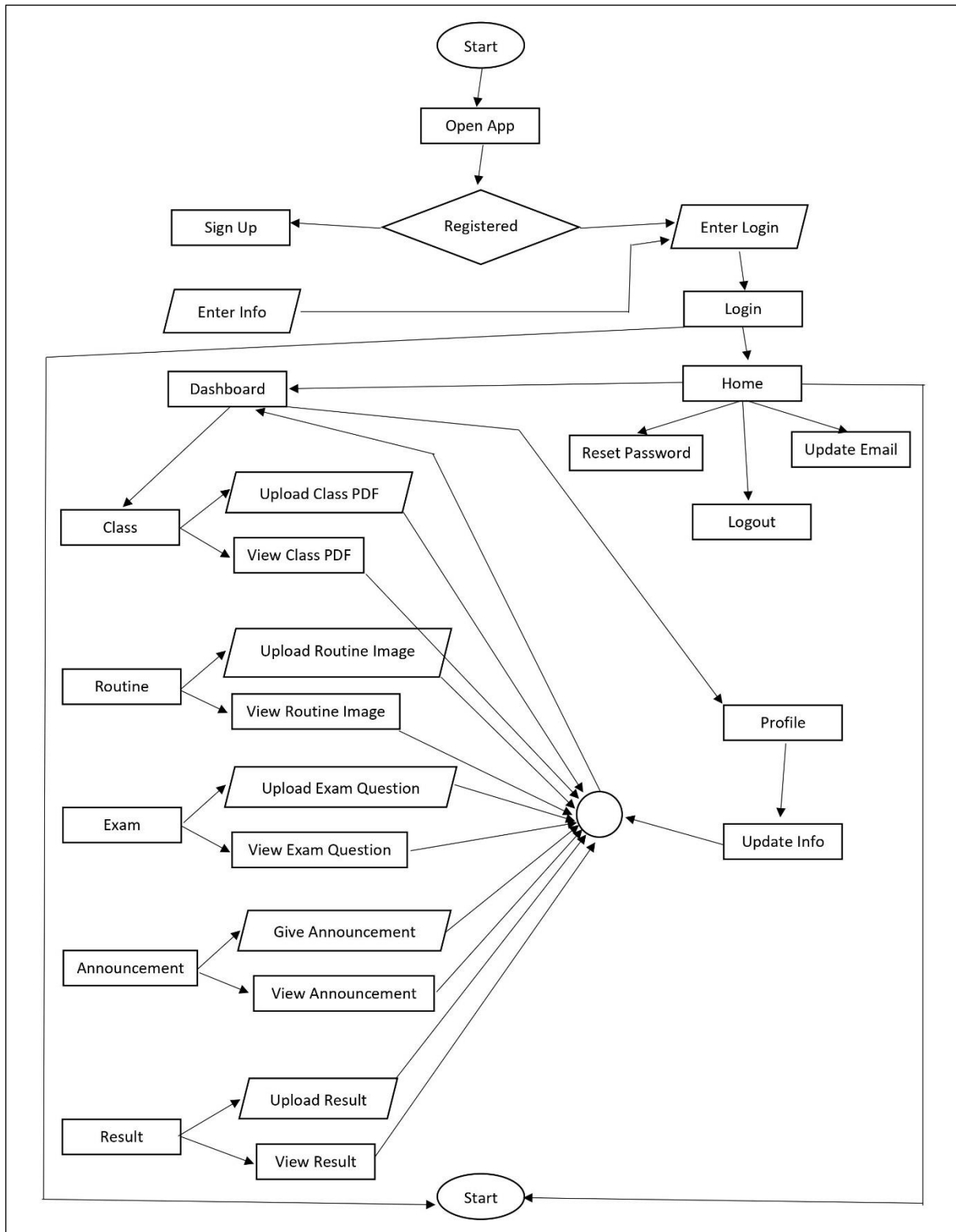


Figure 3.5.1: Flow Chart for E-Learning

CHAPTER 4

DESIGN SPECIFICATION

4.1 Front-end Design

Front-end is the visual part of a mobile application. To keep the application simple, attractive, and user friendly we do follow some design techniques. We have segmented our app into two major parts. The first one is for the teachers and the second section is only for students.

We have tried to keep that application not only simple but also attractive and user friendly. With that keep in mind, we have focused on the application's accessibility and performance in the user part.

The app launches with a splash screen. After that, it will ask the user for login or signup. If a user visits the app for the first time, he/she has to signup first. After that, they can log in with the credential and they can use the app furthermore. We have also kept the registration and login process quite simple.

4.2 Back-end Design

The back-end of a mobile application is mainly the database. It needs regular maintenance and monitoring. All information needs to be stored in the back-end process in our project. To process and store data, we have used the "Google Firebase Database" in our project. It provides real-time data, cloud service, authentication, and some additional features.

4.3 Interaction Design and User Experience (UX)

An application can gain popularity among users if that application is user-friendly. We have put more attention into creating the interface in order to make it more user-friendly. Security is always one of the major concerns of an app. We have ensured the security of the users. We have secured the system by providing email and password, and we have tried to keep that process simple so that users won't be demoralized.

4.4 Implementation Requirements

To implement the project we have used several types of components.

4.4.1 Adobe XD

Adobe XD is used for prototyping, screen design, and illustration. It helps to understand the output of an application before implementation.

4.4.2 Android Studio

Android Studio is an official IDE to develop applications for the Android operating system. Also, some other IDE exists for android application development, but Android Studio has some great features.

4.4.3 SDK

To develop android apps, Android SDK has a set of development tools. It has bundle of libraries along with other API.

4.4.4 Firebase Database

A dynamic database from Google Inc. It offers some very useful tools such as real-time database, authentication, cloud storage, analytics, and many more.

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation of Database

Now let's discuss the database implementation process in our project. Earlier, we had mentioned that Firebase is our primary database. Firebase has several authentication systems which ensure secure access to the database. It provides a healthy and secure way of authentication with verified email and password. Firebase has a real-time database feature that ensures data changes conveniently. Data saved in the firebase as a tree structure. It comes with some security rules to ensure secure access.

Firebase also offers some other authentication processes too. But for our project we are using email and password for the authentication which will be provided by the user and firebase will handle the verification. [Figure: 5.1.1]

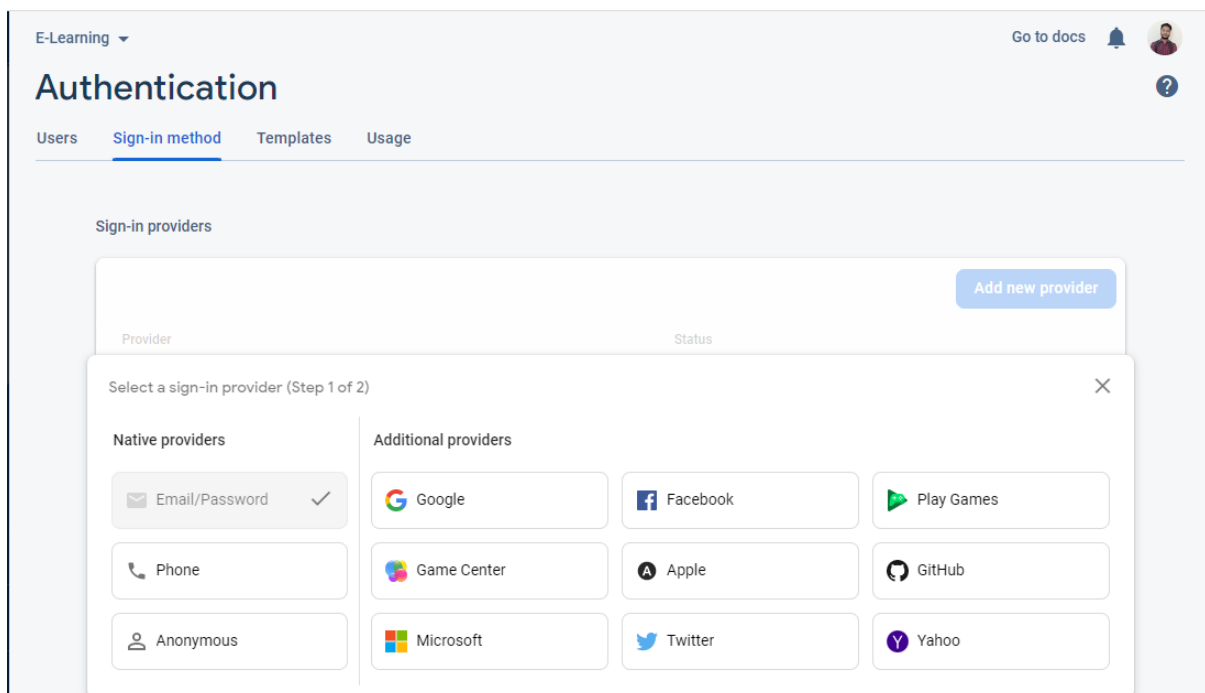


Figure 5.1.1: Authentication Method in Firebase

Registered user details can be shown in firebase with the unique user id and registration time. Also, the last signed-in info will be shown there. [Figure 5.1.2]

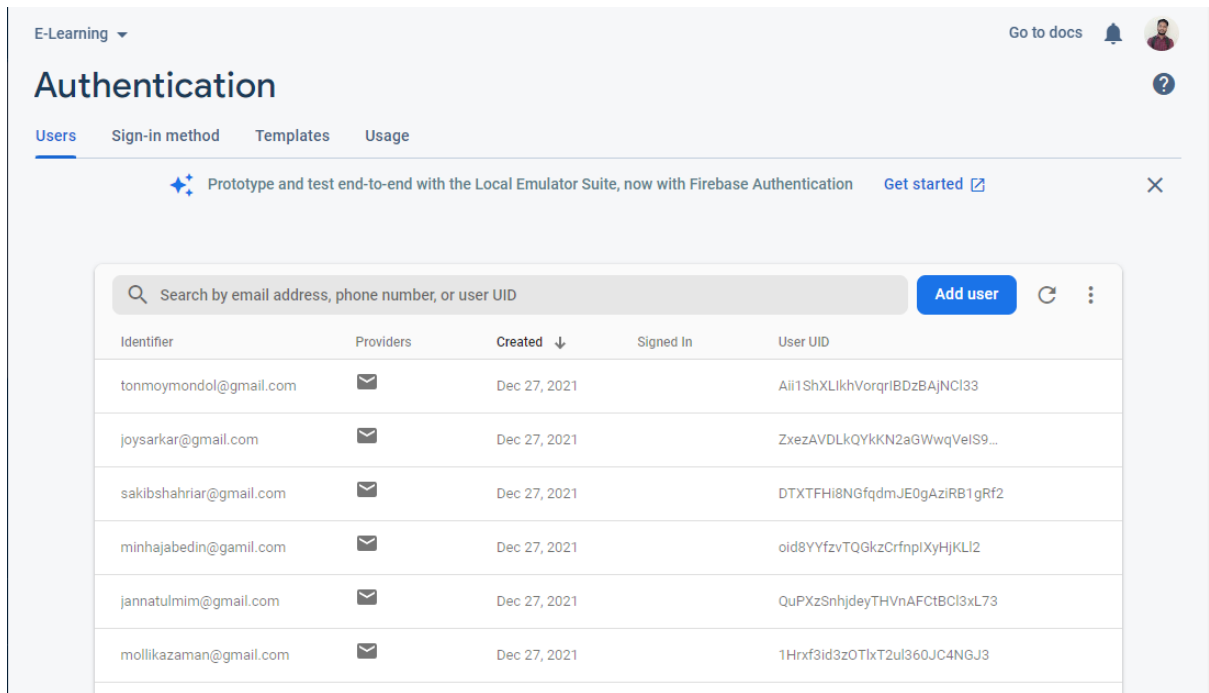


Figure 5.1.2: Registered User List

For authentication, users need to provide their email and password. Our system will send them verification procedures. Next time, users can log in to our system by verified email and password.

In the real-time database, we've stored our application data. The data will be stored as a tree structure in the database. [Figure: 5.1.3]

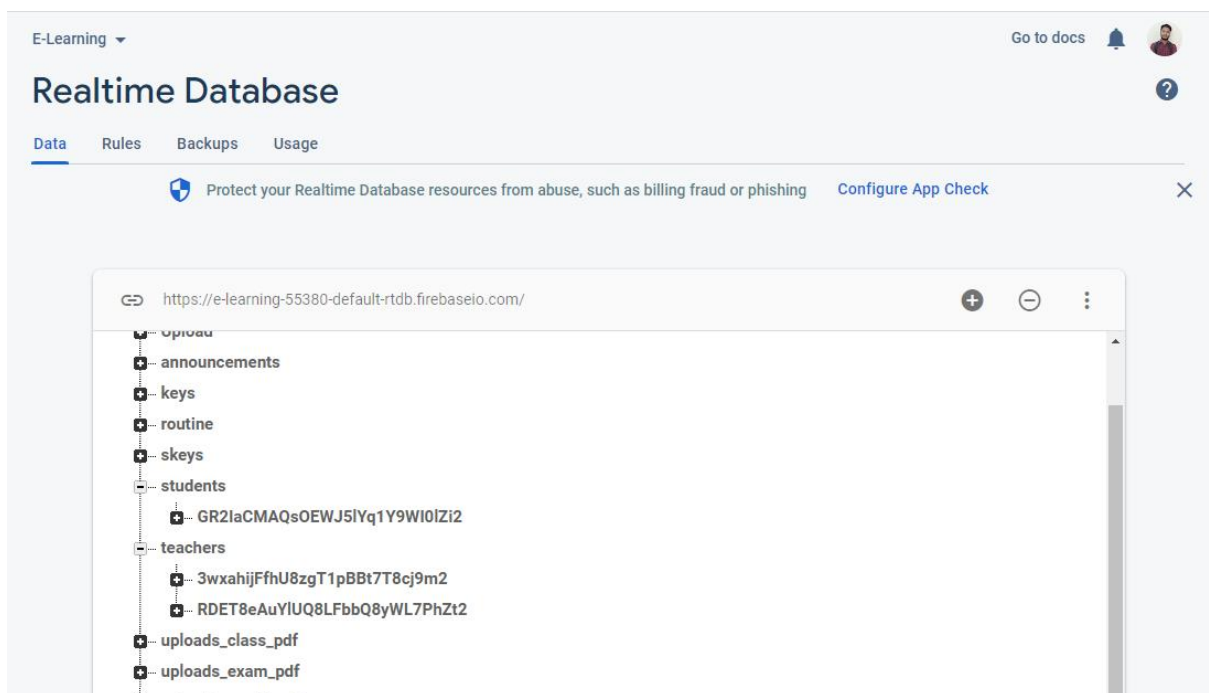


Figure 5.1.3: Database Structure in Firebase

The user info will be stored with a unique user id and the rest of the user details are saved with that. [Figure-: 5.1.4]

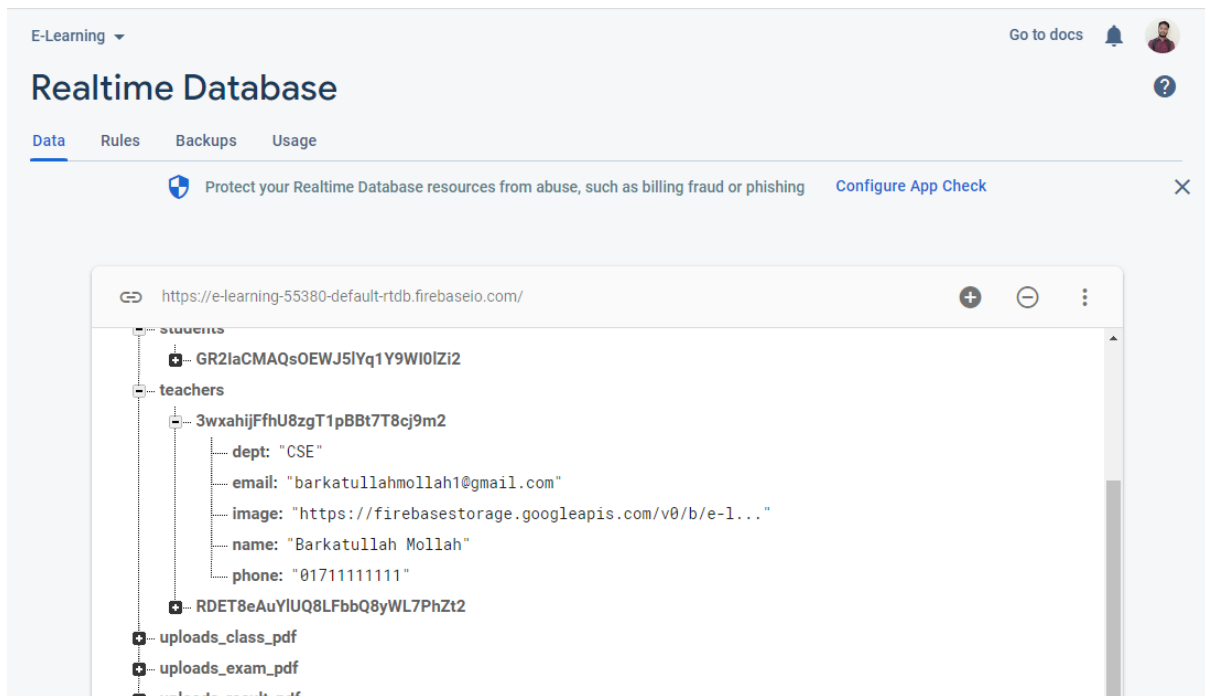


Figure 5.1.4: User Details in Firebase

5.2 Implementation of Front-end Design

Front-end design is always crucial for a mobile app. Users should like the UI, in order to keep using the app. The front-end design for the proposed application is given below-

A splash screen will appear when users launch the app which contains the logo of 'E-Learning' and the slogan name. [Figure: 5.2.1]



Figure 5.2.1: First Screen After Launching the App

Then the user will get an option to choose student or teacher button where they can choose their button. Then they may proceed to go by clicking the ‘Student’ and ‘Teacher’ button. [Figure: 5.2.2]

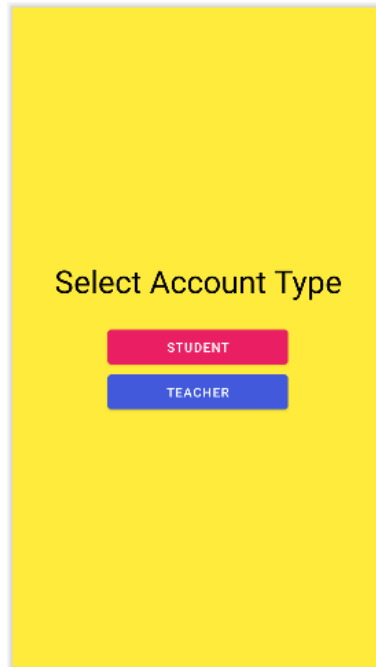


Figure 5.2.2: For Teacher or Student Screen

If the teacher clicks on the ‘Teacher’ button, he will be going to the Teacher panel. Here he will be able to create a new account and log in. [Figure: 5.2.3]

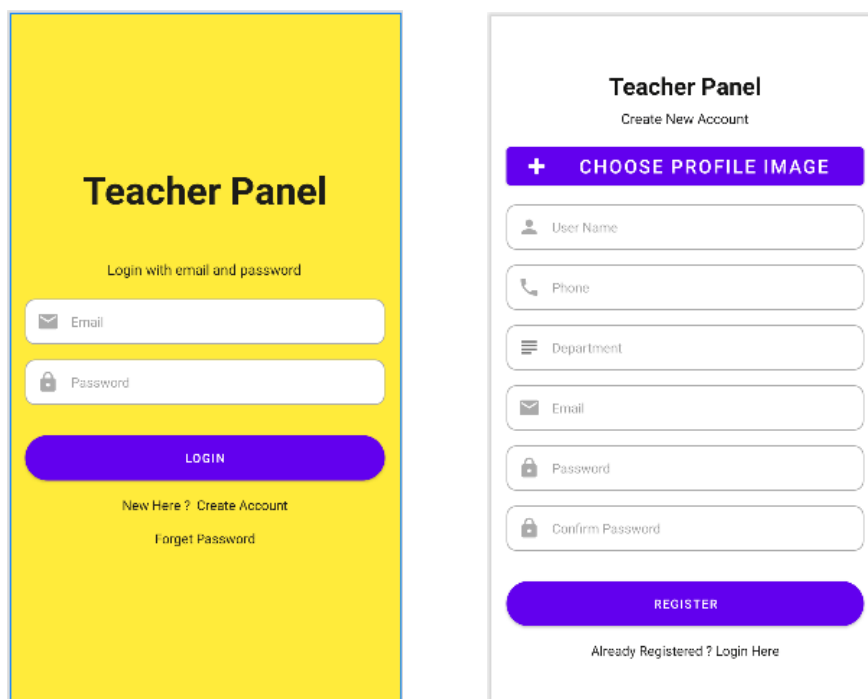


Figure 5.2.3: Teacher Panel

After logging in, it will bring them to the homepage. From now on, they will be able to recover passwords, update emails and log out. [Figure: 5.2.4]

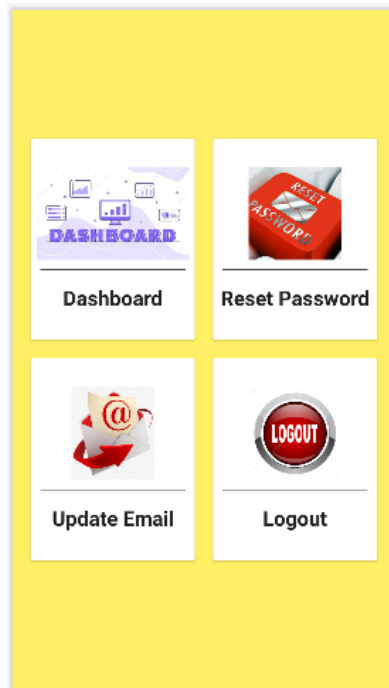


Figure 5.2.4: Home Page Screen

Then go to the dashboard from the homepage. Here the teacher can upload all the information and the students can only see it. [Figure: 5.2.5]

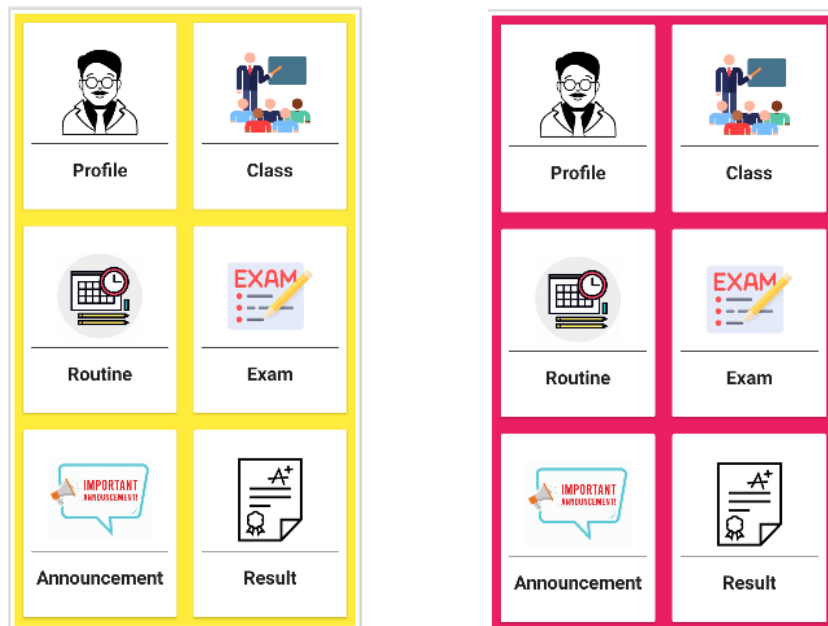


Figure 5.2.5: Teacher and Student Dashboard

By clicking on the profile both teachers and students will be able to see their information.
[Figure: 5.2.6]

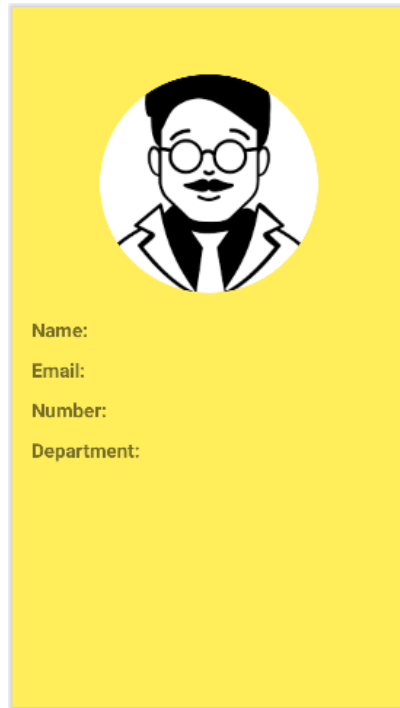


Figure 5.2.6: Profile Screen

In the class option, the teacher will upload the class PDF and the students will be able to view it. [Figure: 5.2.7]

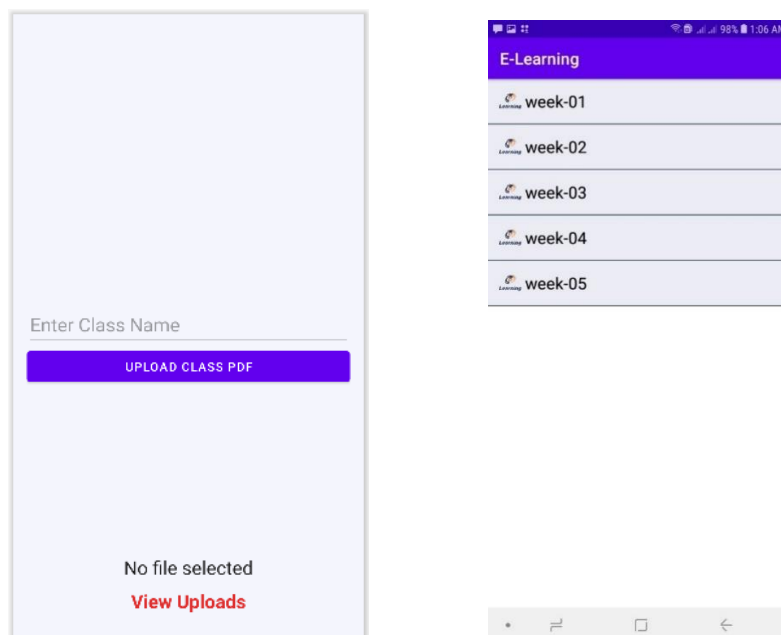


Figure 5.2.7: Class Screen

Here the teacher will upload the picture of the class routine and the student will be able to see it. [Figure 5.2.8]

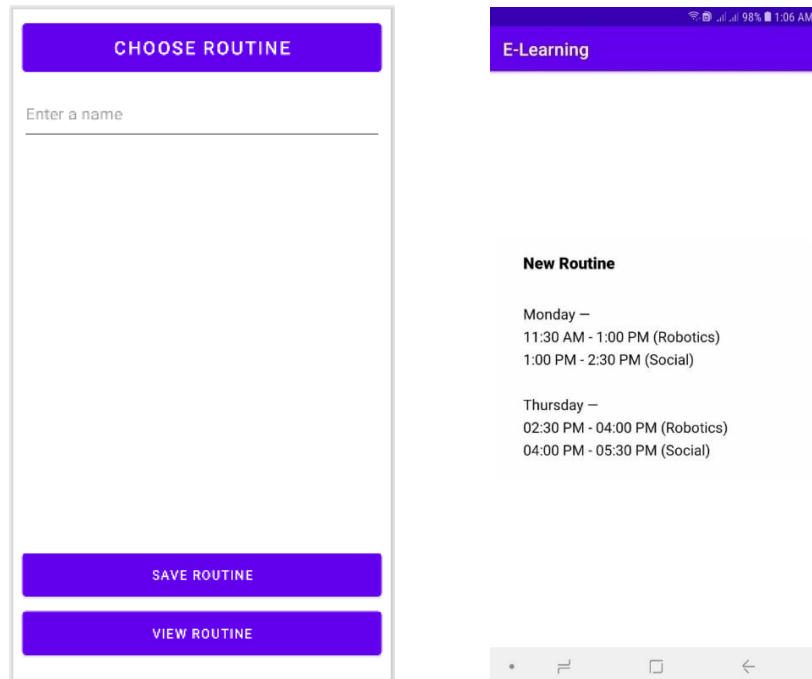


Figure 5.2.8: Routine Screen

Teachers can give PDF of exam questions here students can see it. [Figure: 5.2.9]

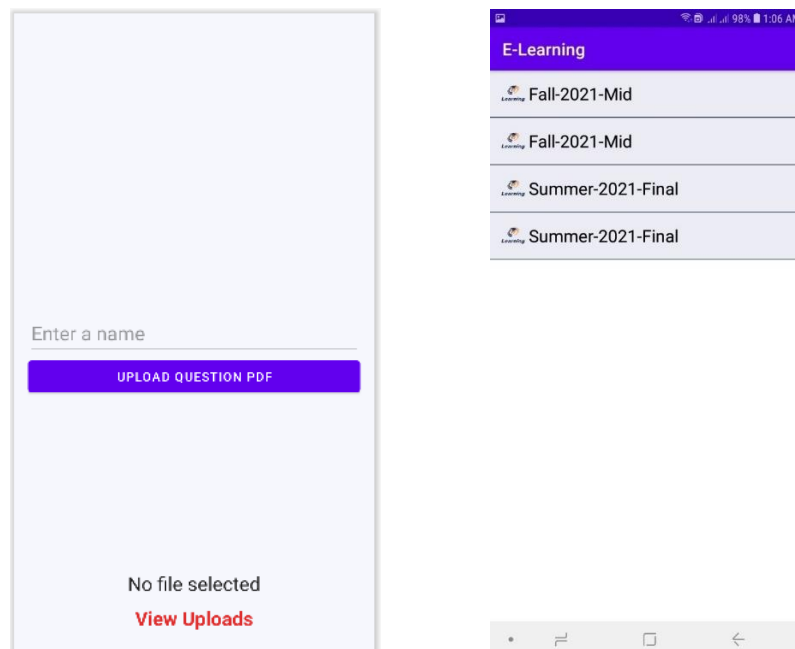


Figure 5.2.9: Exam Screen

Teachers will be able to make various emergency announcements here and all students will be able to see it from now. [Figure: 5.2.10]

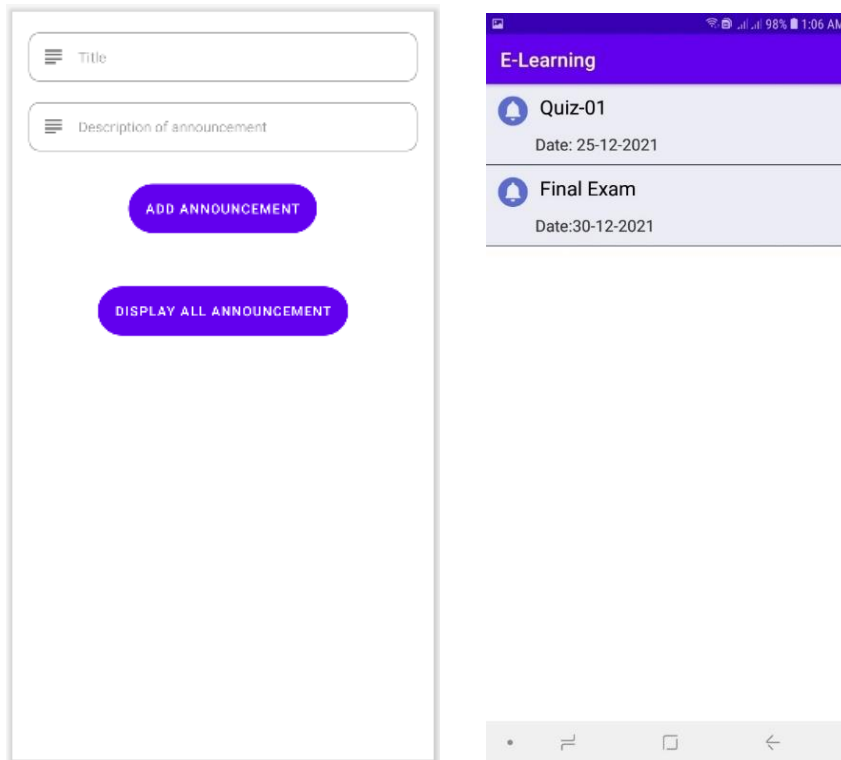


Figure 5.2.10: Announcement Screen

Teachers will be able to publish the results of any exam, students will be able to know their results easily from now. [Figure: 5.2.11]

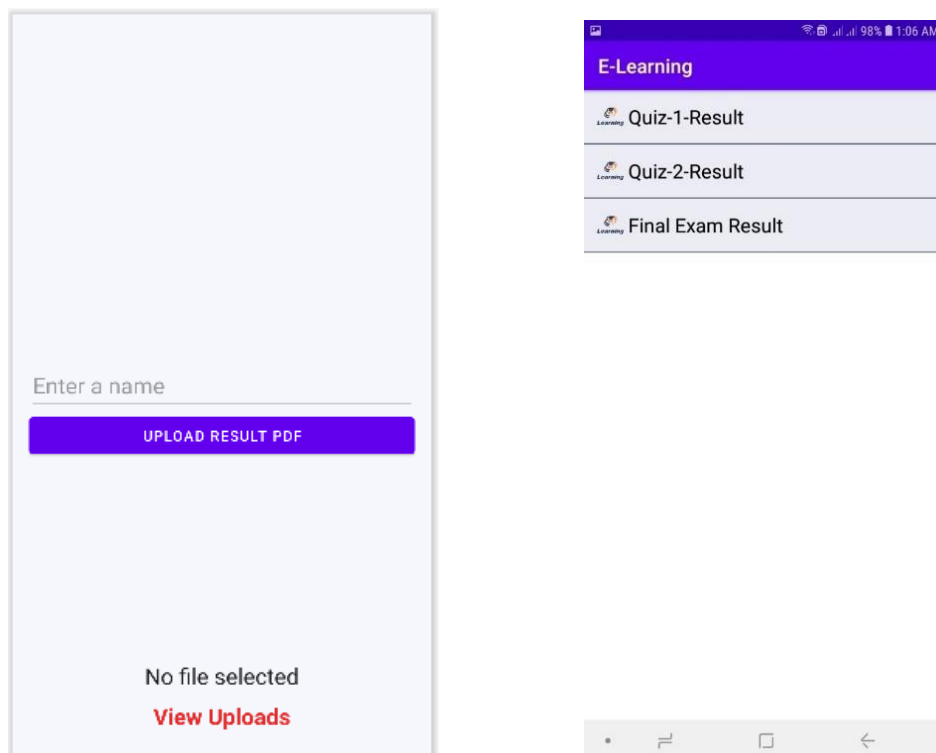


Figure 5.2.11: Result Screen

5.3 Testing Implementation

The following principle were used to evaluate this project:

Requirement Specifications That Are Met: If the project meets all of the requirements, including functional and non-functional, it is said to be successful. To put it another way, it should be capable of ensuring that the requirements are met. One of the most critical needs in software development is correctness. Perfectionism is a prerequisite for service-oriented software. Every component of the program should function properly and accurately.

Compatibility and Integrity: These are two essential factors to consider when determining whether or not a project will be successful. The smart class project was designed to work across all android versions. Furthermore, the system's evaluation was contingent on whether or not the application was integrated into the entire system.

Management of reliability and security: One of the most critical aspects of any service-oriented system is security. As a result, when the system was designed, the evaluation criteria on the security aspects were considered.

User-friendliness: In any application, user-friendliness is a unique criterion for evaluating systems. Users of this solution, for example, should be satisfied with the system when they utilize it. In essence, a system should have features like efficiency, portability, reusability, flexibility, cohesiveness, and loose coupling among different components of the developed software.

5.4 Test Result and Reports

Software tests are commonly used to detect system errors. Examining the code, design, and execution of the entire system can lead to a software test. Testing is required to improve the quality of the system. Another fundamental aspect of software engineering that is sometimes forgotten in project development is a code review and testing. An essential aspect of the system testing development process.

5.4.1 Testing of Functionality

- In functional testing, the tester must check the application to ensure that all of the user's stipulated criteria, as stated in the supplemental constraint system, have been met.
- Functional testing is divided into two types.

- Positive functional testing involves validating the application's functionalities and ensuring that the outputs are correct.
- Negative functional testing entails putting an application through its paces with various invalid inputs, unexpected operating situations, and other "out-of-bounds" scenarios.

5.4.2 Unit Test

Unit testing is commonly utilized during the project's comprehensive design and implementation phases. The purpose of unit testing was to identify the flaws in this project.

5.4.3 Test for Compatibility

Compatibility testing is a type of software non-functional test that evaluates the compatibility of an application with a computing environment. The user experience environment sounds more appropriate for software compatibility testing. This project has been tested on various Android phones to ensure the following:

Table 5.1: Test for Compatibility

Device Name	Display Size	Run The Test	Test Result
Xiaomi Redmi Note 7 Pro	6.3"	Yes	Successful
Realme X2 Pro	6.5"	Yes	Successful
Poco X3	6.7"	Yes	Successful
Redmi Note 8 Pro	6.53"	Yes	Successful
OnePlus 9R	6.7"	Yes	Successful
Samsung Galaxy J7	5.5"	Yes	Successful

CHAPTER 6

IMPACT ON SOCIETY, ENVIRONMENT & SUSTAINABILITY

6.1 Impact on Society

The primary goal of our application is to help teachers and students learn. Both teachers and students can stay connected through this app in any situation. Education will not stop even in an epidemic.

Providing online education for all, from pre-school students to postgraduate students, is beneficial to us as a whole. Not exclusively advanced to get the hang of making more intelligent, more useful human progress, yet, one that is very much aware of new innovations and ready to stick to emerging patterns. In the corporate world, online education similarly influences society. Why? Since the present representatives will be the guides and advisors of our future workforce. By understanding the positive effects of computerized education, organizations can force the following flood of employees, providing them with adaptive and important learning encounters.

6.2 Impact on Environment

The Covid-19 epidemic in early 2020 changed the conventional mode of education for most students in schools around the world, and e-learning at home became a new trend. For students using e-learning, this study shows that perceived intimacy, perceived control and peer references in e-learning have a positive effect on students' self-efficacy and well-being, thus increasing students' motivation for learning. Our aim is to help researchers, instructors, designers, and others identify effective methods for conceptualizing and measuring student engagement in e-learning.

6.3 Ethical Aspects

Effective teaching-learning participation in an online learning community forces both students and instructors to maintain a balance of respect and tolerance with each other. In this sense, participating in an online learning community is not much different from participating in a conventional face-to-face classroom. Indeed, in order to avoid actions that are considered inappropriate in the online education community, if not addressed, a broad set of prior rules and principles is required to establish proper ethical conduct.

6.4 Sustainability Plan

A sustainable plan is required for non-profit management. It is important to analyze the technical, economic, operational feasibility to understand how the company will operate in the long run. Although there will be other competitors in the market. But the organization needs a sustainable plan to meet new challenges every day. Regular maintenance and upgrading with new features and maintaining user expectations will help you compete with competitors.

CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.1 Discussion and Conclusion

Our project is a smart application that can help a user in any circumstances. This project is an online application. So, it is very important for teachers and students. We will add some more features to our project and give our app users the best and best service. Our main goal is to provide better apps and make it easier and more comfortable to use our apps. This app is for the purpose of not stopping the study in any situation. Students will also be able to continue their studies in any situation.

7.1.1 Limitations

Although we want to make things perfect, the reality is, there might be some limitations too. We tried hard to make the application as effective as we can. And yes, it's not the end, a lot of updates will come in the future.

Limitations are-

- It totally depends on the internet.
- Not enough options to stop the fraudulent activities.
- Don't have an iOS/Web based service yet.

7.2 Scope for Further Developments

“E-Learning” has a lot of hope and scopes in the future to make it a valuable and effective app.

Few scopes are mentioned below for future development:

- The interface of our project will be more updated and user friendly.
- As more as much features will be updated.
- The application's dependability should be improved.
- Try to make sure that both Android and iOS user can get the service from us.
- Try to make online attendance system.

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