A Report on:

App and Portal Development

By:

Shashwat Khare	2017A8PS0249P	Electronics and Instrumentation
Shashvat Shukla	2017A7PS0064G	Computer Science
Divyanshu Pandey	2017A3PS0455G	Electrical and Electronics
Harsh Singh	2017A8PS0980G	Electronics and Instrumentation

At:

Council of Science and Technology, U.P.

A Practice School-I Station of

BIRLA INSTITUTE OF SCIENCE AND TECHNOLOGY, PILANI

(11th July, 2019)

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Prepared in partial fulfillment of the Practice School-I Course No. BITS F221

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Acknowledgements

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Abstract

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE PILANI (RAJASTHAN)

Practice School Division

Station: Council of Science and Technology, U.P. **Centre:** Lucknow

Duration: From: 21st May, 2019 **To:** 13th July, 2019

Date of Submission: 11th July, 2019

Title of the Project: App and Portal Development

Name of expert: Smt. Pooja Yadav **Designation:** Joint Director

Name of the PS faculty: Dr. Ashish Tiwari

Keywords: Android, App, Science Quiz, Students.

Project Areas: Computer Science, Mobile Application Development, Computer Programming, Database Management Systems.

Abstract: This report mainly deals with the making of science quiz Android app. There were many parts into which the work was divided. A team of four members was formed to achieve this task in time. Under the guidance of joint director Smt. Pooja Yadav, we were able to develop the app in the specified time. The major parts into which the work was divided are the following:

- Coding and designing of the app
- Database integration in the app
- Layout of the app

This app is highly significant as it will make the students feel confident about their preparation in science. The questions set in this app cover each of the topic of each chapter minutely. Also, this app contains objective questions. This will develop more interest in students in solving these quizzes. By doing this, their preparation will also be done as it will act as a check for the knowledge of a student in a particular subject.

Students:

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Signature of PS Faculty: Dr. Ashish Tiwari

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Introduction

In modern times, children like to spend more time on mobile instead of books. Even several newer methods of imparting education have been developed which make use of digital means like smart classes, MOOCs (Massive Open Online Courses), app-driven education, etc. So, the importance of these innovative digital methods of imparting education has significantly increased.

Realizing this, the Council of Science and Technology required us to make Science quiz app for children studying in classes 6th to 8^{th}. This report is written to highlight the progress so far in developing the Science quiz app. One of the reasons for which we took this project was to gain a deeper understanding of the Android app development.

The app has the feature of logging in multiple users and recording their respective classes and highest scores in each category on a server. Also, the app has online database of questions and answers. This app has been made in the Android Studio IDE (Integrated Development Environment). Programming language used is Java for the logic part of the app and XML is used for describing the layout of the app. Also, SQLite relational database management system is used for the offline part of the quiz while JSON (JavaScript Object Notation) format is used for the online database of the app. Firebase platform is used for the authentication of users of the app and integrating the online database with the app.

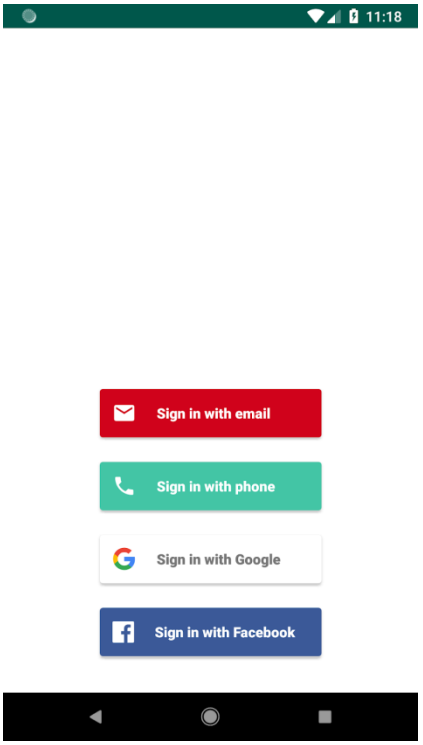
One of the main limitations of the app is that it does not contain subjective questions which check the understanding of a particular topic by a student. Another limitation of the database of the app is that the majority of the questions in the database are from the NCERT books or are based on the NCERT syllabus. Also, the app only focusses on the educational interests of the 6^{th} to 8^{th} standards. Some of the code written for this app has been compiled from various online sources. We have also taken help from online resources for designing the app.

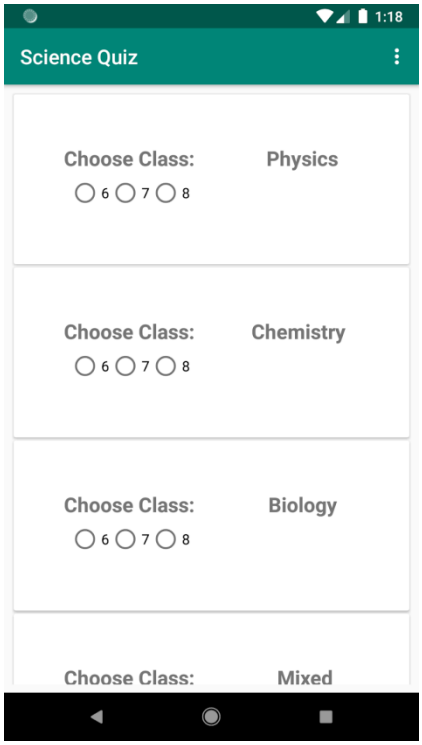
Tour of the app

First page: Login and signup user

4 options:

- any email login
- mobile no. login
- google login
- faecbook

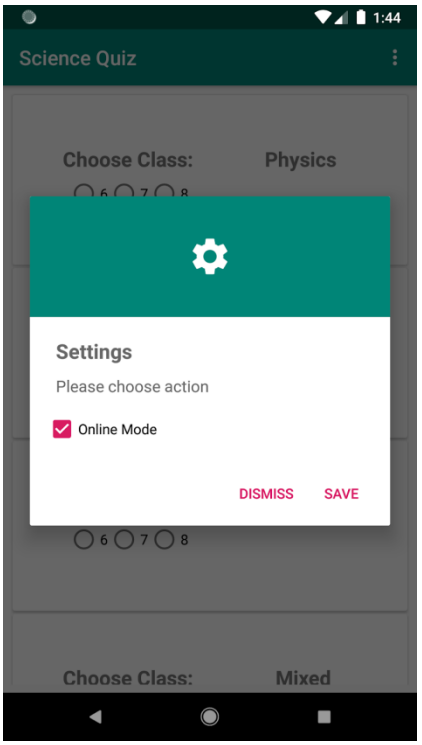


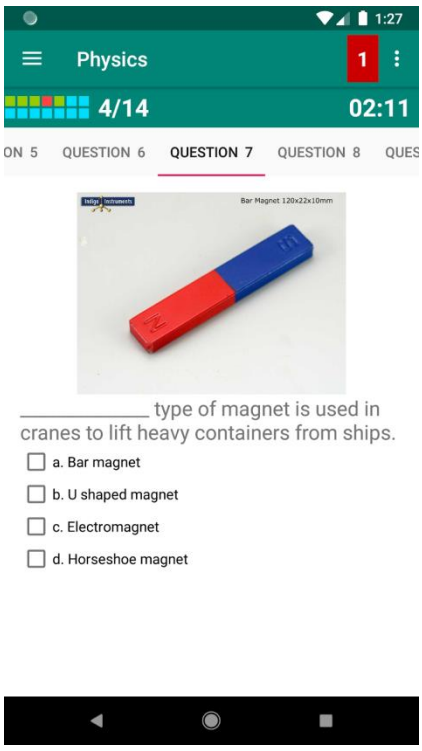


Second page: Select class and subject

Second page(Continued)

Option to choose online or offline mode





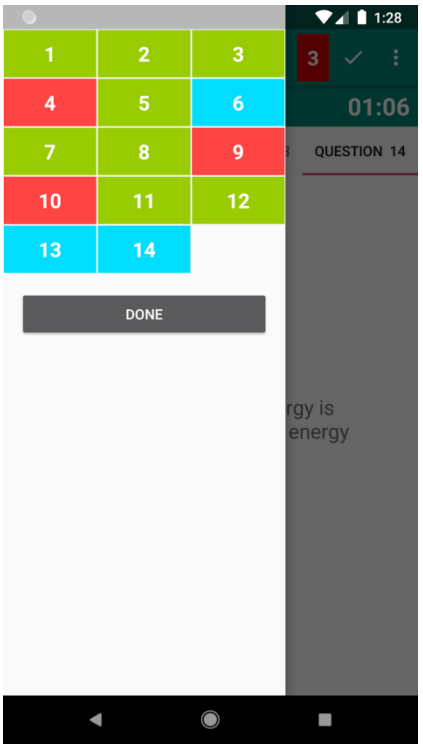
Third page: The Quiz

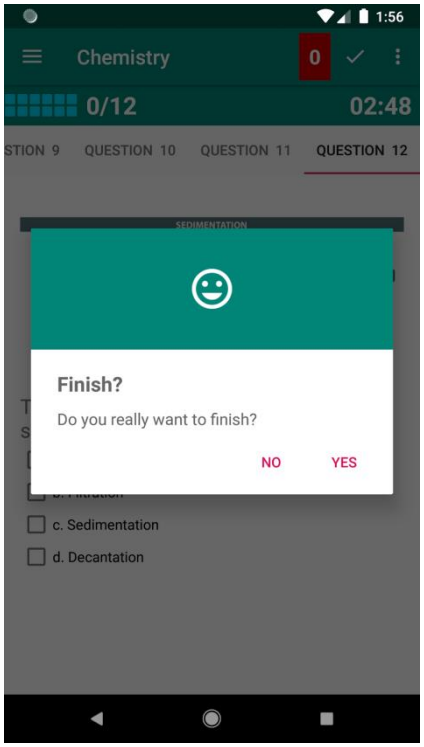
Features:

- Timer
- Correct answer count
- Wrong answer count
- Visual feedback on right and wrong answers
- Image- to make the quiz immersive

Third page(Continued)

Sidebar to provide a visual feedback on the progress on quiz so far

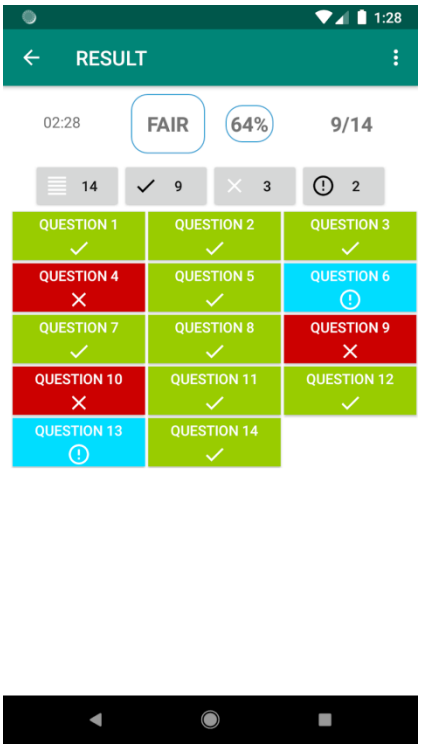


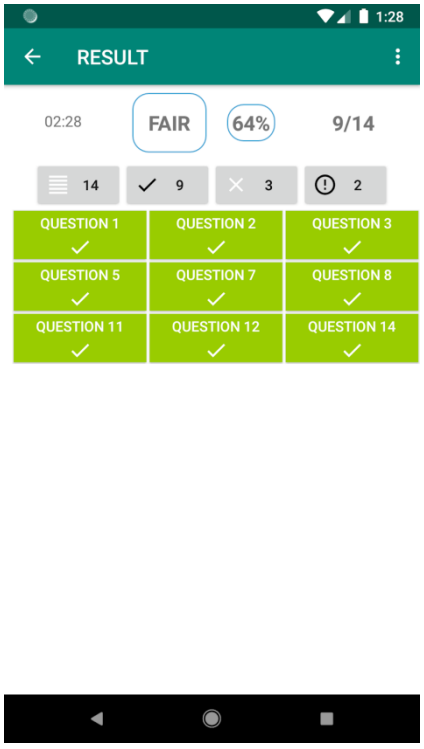


Third page(Continued)

'Finish quiz' dialog box

Fourth page: Result



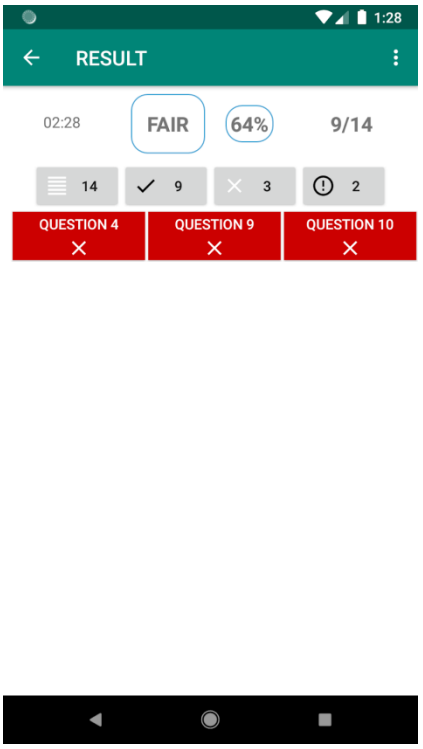


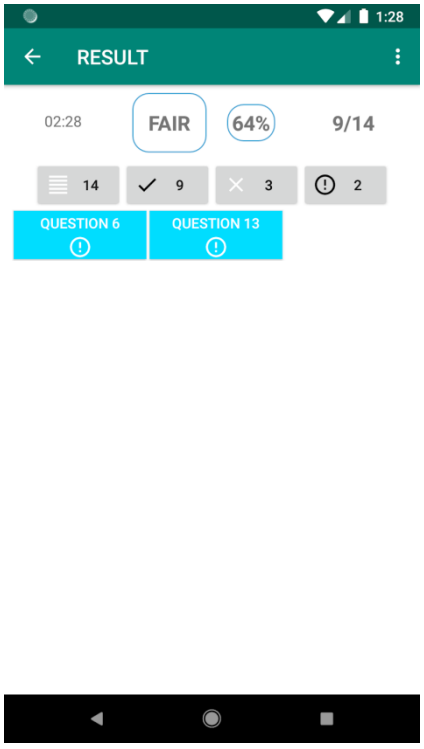
Fourth page(Continued)

Correct answers

Fourth page(Continued)

Wrong answers





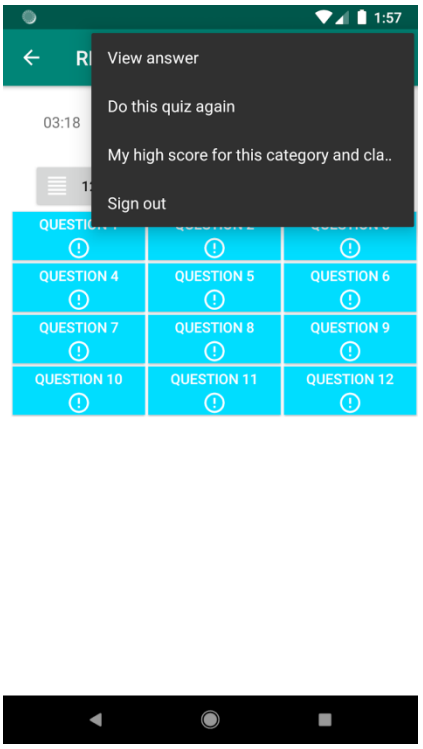
Fourth page(Continued)

Questions not attempted

Fourth page(Continued)

Options:

- View answers
- Do this quiz again
- User's high score
- Sign out



Coding and Designing of the App

The work on the app began with the designing of the app. First, we sat down to note all the mandatory features which the app should have. The features required in the app, as told by our project head- Smt. Pooja Yadav, were:

- Multi user app with a login and sign up page.
- Ask each new user for their class.
- Keep simple science questions in the app from each of these categories- Physics, Chemistry and Biology.
- Keep one 'mixed' category as well which should contain questions from all the 3 above categories.
- Each category must have at least 10 questions per play.
- The questions and answers database must be online as well as offline.
- Majority questions will be in the online database.
- The online database must be expandable to 3 to 4 thousand questions.
- The app should store each user's high score in their respective account.

After this, we began to elaborate on each of these features by deciding every detail of every feature minutely.

We made the app using Android Studio as the IDE (Integrated Development Environment). We used the java programming language for writing the logic part for the app code, and XML markup language for making the layouts of the app.

To make the database of the app online, we decided to use a platform familiar to us - Firebase, a mobile and web application development platform provided by Google. We used the authentication and database features of the Firebase platform for logging in and signing up users and adding the online database of the questions and answers.

For making the app multi user, we decided to use the FirebaseUI, a set of open-source libraries for Firebase that allow one to quickly connect common UI elements to the Firebase database for data storage, allowing views to be updated in real time as they change, and providing simple interfaces for common tasks like displaying lists or collections of items.

The coding for the app happened after designing all the required activities of the app and defining all the functionalities of each of those activities. Three main activities apart from the login and sign up age were added in the app. After logging in the app, the first activity displays the categories of questions for playing the quiz and asks the user for their class. When the user selects one of the categories along with their class, another activity opens up. This second activity displays questions and options for answers one by one in a horizontal scrolling format. The activity has a timer for limiting the time taken by the user in answering the questions. After finishing the quiz, the app displays the final activity where the score (in percent) obtained by the user is displayed. Also, time left from answering the quiz, no. of correct answers and no. of wrong answers will also be displayed. After this, the user may choose to take the quiz again or go back to the categories activity.

During the process of coding the app, we had to test the app several times to make sure that all the features were working correctly. Also, we had to debug the app from several runtime errors which were making the app to crash while running.

Database Integration in the App

- Insertion of the science questions and answers in the database was done. The questions required for this database were of 6-8th standard.
- Acquired knowledge of SQL (Structured Query Language) which is essential for handling the database. Also made the categories such as Physics, Chemistry, Biology in the database so that these categories have their respective questions and answers.
- Also, each category was classified into classes 6th, 7th and 8th.
- Successfully completed the work of entering the values in the database and updating those values from time to time. Finally, the database was completed in terms of filling data into it.
- There were various sources for collecting the data. First of all, NCERT books of 6-8th standard were referred. Since it is a science app, science books were referred. Then there were online sites where multiple-choice questions of various chapters were available. Some of the questions were added by me as I was personally interested in framing some tricky questions which would sharpen student's mind while one is attempting the quiz.
- A survey was done so as to try to find the most basic and essential questions. Main objective was to provide the students with knowledge in all the topics of any particular chapter of any standard from 6-8th.
- It was observed that the questions framed are beneficial for the students and these multiple-choice questions will prepare the complete syllabus of the students of the respective standards.
- Finally, the database was completed successfully. Any changes were updated in the database from time to time. The reason why we could apply these changes was that the database was flexible enough to be changed when needed.

- Later on, we also added one image per question in the database so as to provide users with a more immersive quizzing experience.
- A little problem was faced in this approach of making of the database. The reason for this was that the software used in making the database was not user friendly on the Linux operating system.

Conclusions and/or Recommendations

The app can have a better variety of questions ranging across various existing educational boards for 6^{th} to 8^{th} standards.

The app can have options for the user to choose from various themes for the layout of the app.

The app can have an analysis report of the user for the past records of taking quiz in the app.

The app can have different levels of quiz for a game like immersive experience.

Appendices

Appendix A

Dependencies/Libraries used in our app:

fileTree(dir: 'libs', include: ['*.jar'])

com.android.support:appcompat-v7:28.0.0

com.android.support:exifinterface:28.0.0

com.android.support:design:28.0.0

com.android.support.constraint:constraint-layout:1.1.3

com.android.support:support-annotations:28.0.0

android.arch.lifecycle:extensions:1.1.1

com.google.firebase:firebase-database:17.0.0

junit:junit:4.12

com.android.support.test:runner:1.0.2

com.android.support.test.espresso:espresso-core:3.0.2

com.squareup.picasso:picasso:2.71828

com.readystatesoftware.sqliteasset:sqliteassethelper:+

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com.google.code.gson:gson:2.8.5

com.google.firebase:firebase-auth:17.0.0

com.firebaseui:firebase-ui-auth:4.3.1

com.google.android.gms:play-services-auth:16.0.

com.facebook.android:facebook-android-sdk:[5,6)

com.github.d-max:spots-dialog:1.1@aar

io.paperdb:paperdb:2.6

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- ICSE SCIENCE TEXT BOOKS FOR 6-8TH STANDARDS
- https://opensource.google.com/projects/firebaseui
- NATIONAL SCIENCE OLYMPIAD QUESTIONS OF THE RESPECTIVE STANDARDS
- https://www.youtube.com/watch?v=SDIg9u2MpM8
- https://www.youtube.com/watch?v=EO-_vwfVi7c
- https://www.youtube.com/watch?v=KvfHeQpVZlA
- https://www.youtube.com/watch?v=vhLokPW_a-U
- https://www.youtube.com/watch?v=GyuR7WIKnIY
- https://www.youtube.com/watch?v=QMw4xDYdCXQ

Glossary

Technical Term	Definition	Page Number
Integrated Development Environment (IDE)	A software application that provides comprehensive facilities to computer programmers for software development.	8
Database	A structure of data held in a computer.	10
NCERT	National Council of Educational Research and Training	10
LINUX	Operating System	11