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Keywords:

mobile software, UniQuiz, SQLite,
application

Design and Implementation of an Adaptive Quiz Application for University students on Android

ABSTRACT

The exponential growth in the use of digital technologies and the availability of mobile software applications has been well documented over the past decade. We focus on how mobile devices are used within the classroom environment and how to integrate the mobile application into the teaching process in higher education. In this paper, A mobile application called UniQuiz (University Quiz) which was developed using Android Studio. This app aims to evaluate the students by answering a number of questions within a specific time. If the student can answer all questions before the time ends, the degree the student obtained will be shown to him/her. An SQLite database containing the student's name, code, and the degree. If the time expires before answering all questions, the application will be finished, all remaining questions will be cancelled, the degree will be shown for the answered questions, and stored n SQLite database. This application measures the student's knowledge of the course content that the student is studying. This application is implemented using Android studio program.

1. Introduction

Now a days, everyone needs smart phones majorly people use Android phones for day-to-day communication. Many applications are developed for various purposes in people's lives and the android system has become popular in the market of smart phones [1]. Mobile learning has been claimed as the future of learning [2] yet surprisingly little specific empirical investigation of mobile application [3]. While digital devices are prevalent in the higher education environment, the use and uptake of mobile apps for tertiary teaching and research by academic staff has only begun to be studied [4-5]. Mobile application development is the process of creating specific software applications that run on mobile devices or it is the strategic process for designing, building, and launching a mobile app successfully. There is an overview of the mobile app development lifecycle:

1. **Researching:** any mobile app begins with an idea. Your app can be successfully only when the idea benefits your app users. Ensure that your analysis includes the demographics, motivations, and behavior patterns of your buyers.
2. **Wireframing:** it is the process of drawing a detailed sketch of the envisioned product help you uncover the usability issues of your app. After sketching wireframing helps refine your idea and organize all essential components.
3. **Assessing Technical Feasibility:** Asking questions, brainstorming ideas, and reviewing the status allow your team to decide the initial functionality's feasibility.
4. **Prototyping:** creating working prototypes of your application allow you to verify if your development process is moving in the right direction or not. You can validate the information you have gathered.
5. **Designing:** Create multiple variations of the screen. A clear visual direction helps you visualize the final product.
6. **Developing:** it is the core phase of the application, where you develop the mobile app.
7. **Testing:** in this step, the app is delivered to the user app to test its user experience. Their feedback and opinions will help you add what your app lacks from their point of view.
8. **Launching:** Publish your app to the app store.

Main objectives of the research are: Enhancing user interaction through the use of modern technology, reducing time and effort in the grading and score recording process, and improving the assesement methods to make them more efficient and user-friendly. The rest of this paper is organized as follows:

Section.2 proposes a literature review that presents the previous related work in integration of mobile technology in higher education. Section.3 discusses the main steps of quiz mobile application. Section .4 presents the experimental results and discussion to clarify the application operation. Section.5 shows the Comparison between UniQuiz and existing quiz applications. Finally, we sum up in conclusions and future work in section.6 and a list of the used references is given at the end of the paper.

2. Literature Review

In this section, we state some research that talk about the integration of mobile technology in higher education. They are focused on how mobile devices are used in classroom environment, rather than their application to research process [6-8].

In [9] outlines techniques and strategies for the use of apps to support learning, teaching, and research.

In [10] made ECARE survey of undergraduate students and information technology. In this survey, they found the students see technology as means as of better engagement with study material, instructors, and peers in classroom. In [11] discovered that 95% of students used smart phones and 91% of students used laptops.

In [12] made studies of higher education students in southeast Asian universities reveal even higher percentages, i.e., 100% of Hong Kong undergraduates in a 2018 study possessed mobile phones, of whom 85% also used apps for their academic studies.

3. UniQuiz Application:

In this section we propose main steps of the quiz mobile application. It is divided into three stages Enrollment, Answer to quiz, and store quiz result. All these steps are shown in Flowchart in Fig. 1.

3.1. Enrollment Stage

In this stage, each student can register his personal data such as (student_name, student_code).

- ✓ Enter your student's name.
- ✓ Enter your student's code.
- ✓ After registration, we can save all the personal data of each student.

3.2. Answer To Quiz

- ✓ In this stage, we set timer with a specified time.
- ✓ Within this timer we can answer all the quiz question.
- ✓ Display the 1st question. Each question has 4 choices. When an option is selected, it changes color to indicate selection.
- ✓ To enter your answer, press Submit button. Comparing the chosen answer with the correct answer. If it is true, increase the score by one and go to the 2nd question.
- ✓ Check the timer counter, if the specified time has not finished, we can complete answer the rest of the questions. If the time runs out, the quiz will close and discarded any unanswered questions.
- ✓ At end, the final score will be displayed on the screen.

3.3. Store Quiz Result

- ✓ After the quiz is completed, the results are stored data in SQLite data base. "SQLite is a lightweight, serverless relational database engine that is widely used in Android applications for local data storage. In this study, SQLite was utilized to store quiz questions, user responses, and test scores. Its integration within the Android platform allows for offline data access, fast execution, and simplified management of structured data, making it ideal for educational mobile applications that require real-time interaction without constant internet connectivity."
- ✓ Data stored such as: Student_name, Student_code, and score.

✓ Pesoudo code of Sqlite database:

```
// 1. Define database helper class
Class DatabaseHelper extends SQLiteOpenHelper:
    - Define database name and version
    - Define table names and column names
    Function onCreate(database):
        - Create table "Quiz" with columns:
            - ID (INTEGER PRIMARY KEY)
            - Question (TEXT)
            - Option1 (TEXT)
            - Option2 (TEXT)
            - Option3 (TEXT)
            - CorrectAnswer (TEXT)
        - Create table "Results" with columns:
            - ID (INTEGER PRIMARY KEY)
            - UserID (INTEGER)
            - Score (REAL)
            - Date (TEXT)
    Function onUpgrade(database, oldVersion, newVersion):
        - Drop old tables if they exist
        - Call onCreate() to recreate tables
// 2. Insert quiz questions
Function insertQuestion(question, options, correctAnswer):
    - Open writable database
    - Create ContentValues with question data
    - Insert into "Quiz" table
    - Close database
// 3. Retrieve quiz questions
Function getAllQuestions():
    - Open readable database
    - Query "Quiz" table
    - Read each row and convert to Question object
    - Return list of questions
// 4. Store user quiz result
Function saveResult(userId, score, date):
    - Open writable database
    - Insert new row into "Results" table
    - Close database
// 5. Analyze performance
Function calculateAverageScore(userId):
    - Open readable database
    - Query "Results" table for scores of given user
    - Calculate average
    - Return result

// 6. Close database connection when done
```

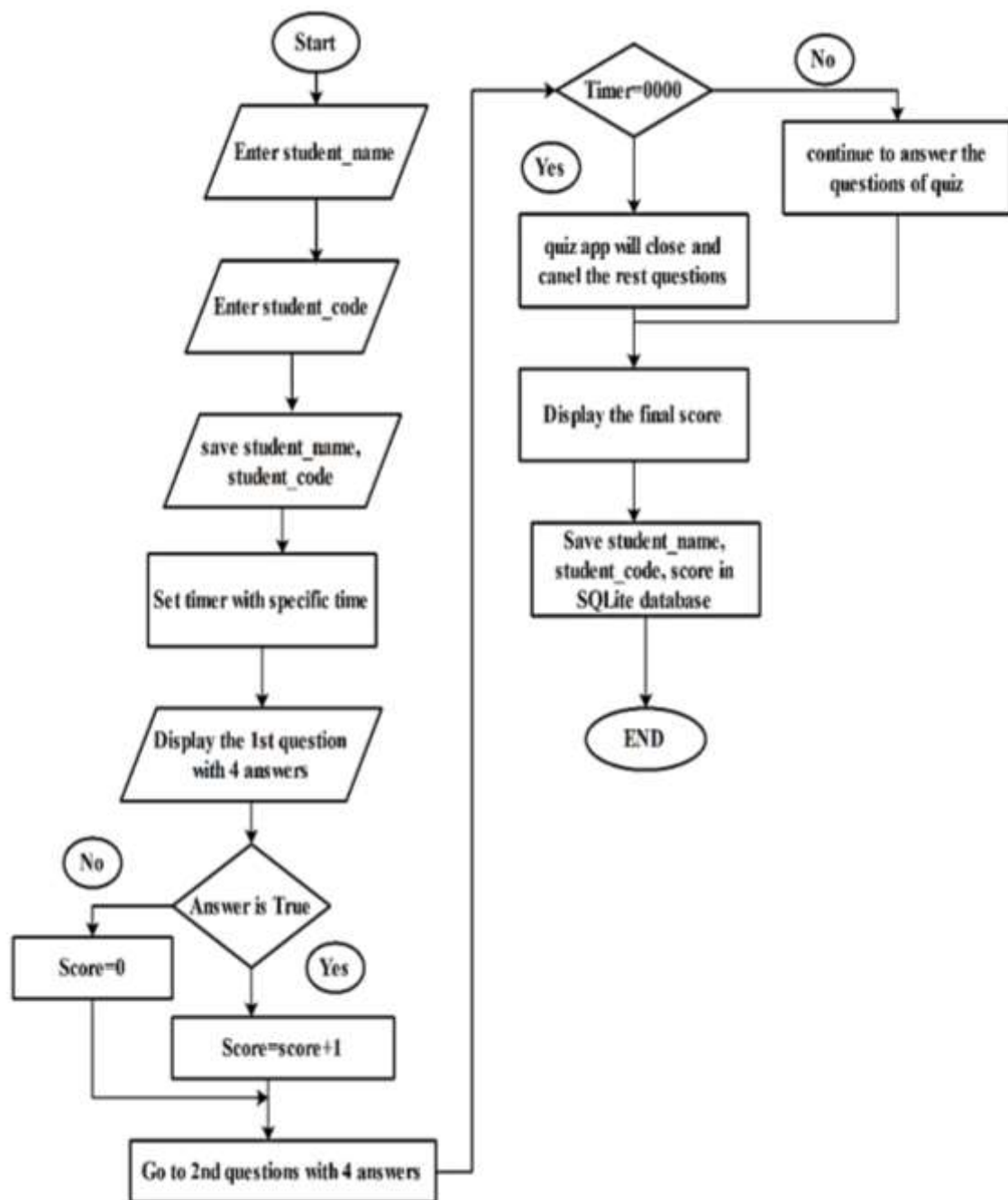


Fig. 1 Flowchart of quiz Mobile App

4. Discussion and results

We implemented of the quiz mobile app in android studio with 3 stages. Each stage has its own layout.

Enrollment stage layout:

In this layout, we can enter the personal information to each student. This information such as name, and code. After the entering data we can go to the quiz app layout when pressing on the " GO TO QUIZ". It is shown in Fig. 2.



Fig.2 Enrollment Layout

Answer to quiz

This layout consists of many parameters such as:

1. Total number of questions.
2. Timer Count.
3. Place of each question, as well as a place for four answers. As this text differs according to the question index with its 4 answers.
4. Four choices to each question.
5. Button to submit your answer. On clicking this button, check the chosen answer if it true or not and go to the next question. All parameters in Fig. 3.

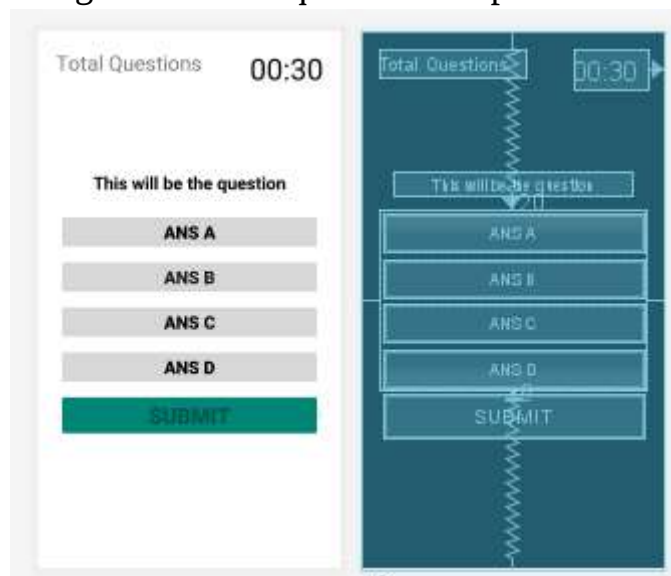


Fig. 3 Quiz App

Store quiz result

After finishing the quiz question according to the timer. We can obtain the final score of each student. In the enrollment layout, we save the personal data student_name and student_code. All data are stored in SQLite database as shown in the below Table.1.

stud_degree	stud_code	stud_name	ID	
رَشَح	رَشَح	رَشَح	رَشَح	
3	522022220	Amal Zarif Mahfouz	1	1
5	52022100	Ali Ahmed	2	2
4	52022002	Ahmed Ali	3	3
1	52022001	amany Zarif	4	4
4	52022000	Youness	5	5
2	52022005	ekramy zarif	6	6
5	52022006	Asmara zarif	7	7
4	52022008	Samar zarif	8	8
5	52022000	ahlam mohammed	9	9

Table.1 A sample of database

Before the storing the quiz result, we need to classify the degree of each student if it is excellenr, very good, good, pass, and fail. This classification according to this conditions:

Stud_degree = 5	grade is "Excellent"
Stud_degree = 4	grade is "Very Good"
Stud_degree = 3	grade is "Good"
Stud_degree = 2	grade is "Pass"
Stud_degree = 1	grade is "Fail"

These classifications is shown in Table.2

Table.2 A final database

Grade	Stud_degree	Stud_code	Stud_name	ID
Good	3	522022220	Amal Zarif Mahfouz	1
Excellent	5	52022100	Ali Ahmed	2
Very Good	4	52022002	Ahmed Ali	3
Fail	1	52022001	amany Zarif	4
Very Good	4	52022000	Youness	5
Pass	2	52022005	ekramy zarif	6
Excellent	5	52022006	Asmaa zarif	7
Very Good	4	52022008	Samar zarif	8
Excellent	5	52022000	Ahlam mohammed	9

The final form of the program in Figure.4. This figure illustrates score that you obtained from 5 and your grade according to the previous conditions.

Your Score: 4.0 / 5.0
Grade: Very Good
Great job! You're doing well. Try again to reach "Excellent"!

Fig.4 Final program result

5. Comparison with Existing Quiz Applications

To evaluate the effectiveness and scope of the proposed UniQuiz application, we compared it with several existing quiz platforms such as Google Forms, Kahoot, Quizizz, Socrative, and ClassMarker. The comparison is based on several educational and technical criteria:

5.1. Question Types

UniQuiz currently supports only multiple-choice questions (MCQs), which limits its flexibility. Other applications like Google Forms and Kahoot support a variety of question formats, including true/false, short answer, matching, and ordering.

5.2. Time Management

UniQuiz applies a fixed timer for the entire quiz session. Other applications (e.g., Quizizz) allow setting time limits for each individual question.

5.3. Database and Storage

UniQuiz uses a local SQLite database to store quiz data on the device. Other applications often utilize cloud-based storage systems (e.g., Firebase, MySQL).

5.4. User Interface and Experience (UI/UX)

UniQuiz provides a basic, functional interface but it needs audio visual effects.

While UniQuiz offers simplicity, offline functionality, and a clear focus on assessment automation, UniQuiz a highly competitive tool in the field of mobile learning.

6. Conclusion

The UniQuiz mobile app made the evaluation process significantly easier. It achieves many advantages: (1) Facilitating the evaluation process, as the quiz is very important in the evaluation the educational process. (2) Measuring the student's speed skill to complete a number of questions in a specific time. (3) Reduces the workload on lecturers by automating grading and giving degree to each student. (4) Savings on lectures from the process of storing grades, as the saving process is done automatically in SQLite database. (5) Conducting quizzes using the most important element in the practical life, which is the mobile device. (6) After assessment, we will know the parts that are not understood by most students and explain them again. This will improve the education process.

Future Work

In the future, we make a registration step for each student. This step will help us to make database creation for an authentication students. We will apply the voice message that know each student whether each answer is true or false. We will implement AI adaptive application where the questions are displaying according to student performance.

REFERENCES

- [1] Verma, N., Kansal, S., & Malvi, H., " Development of native mobile application using android studio for cabs and some glimpse of cross platform apps", International Journal of Applied Engineering Research, 13(16), pp.12527-12530, 2018.
- [2] Bowen, K., & Pistilli, M. D., " Student preferences for mobile app usage", Research Bulletin) (Louisville, CO: EDUCAUSE Center for Applied Research, forthcoming), available from <http://www.educause.edu/ecar.>, 2012.
- [3] Hinze, A., Vanderschantz, N., Timpany, C., Cunningham, S. J., Saravani, S. J., & Wilkinson, C., " A study of mobile app use for teaching and research in higher education Technology, Knowledge and Learning", pp.1-29, 2022.
- [4] Lai, K. W., & Smith, L., " Socio-demographic factors relating to perception and use of mobile technologies in tertiary teaching", British Journal of Educational Technology, 49(3), pp. 492-504, 2018.

- [5] Shraim, K., & Crompton, H., " Perceptions of using smart mobile devices in higher education teaching: A case study from Palestine. *Contemporary Educational Technology*", 6(4), pp.301-318, 2015.
- [6] Morris, N. P., Lambe, J., Ciccone, J., & Swinnerton, B., " Mobile technology: students perceived benefits of apps for learning neuroanatomy", *Journal of Computer Assisted Learning*, 32(5), pp. 430-442, 2016.
- [7] Pedro, L. F. M. G., Barbosa, C. M. M. D. O., & Santos, C. M. D. N., "A critical review of mobile learning integration in formal educational contexts", *International Journal of Educational Technology in Higher Education*, 15(1), pp.1-15, 2018.
- [8] Schepman, A., Rodway, P., Beattie, C., & Lambert, J., "An observational study of undergraduate students' adoption of (mobile) note-taking software", *Computers in human behavior*, 28(2), pp.308-317, 2012.
- [9] MacNeill, F., "Approaching apps for learning, teaching and research", *Smart learning: Teaching and learning with smartphones and tablets in post compulsory education*, 238-264, 2015.
- [10] Galanek, J. D., & Gierdowski, D. C., " ECAR study of faculty and information technology", 2019.
- [11] Galanek, J. D., Gierdowski, D. C., & Brooks, D. C., " ECAR Study of Undergraduate Students and Information Technology", 2018. EDUCAUSE, 2018.
- [12] Wai, I. S. H., Ng, S. S. Y., Chiu, D. K., Ho, K. K., & Lo, P., " Exploring undergraduate students' usage pattern of mobile apps for education", *Journal of Librarianship and Information Science*, 50(1), pp. 34-47, 2018.