International Journal of Innovative Research in Electronics and Communications (IJIREC)
Volume 9, Issue 1, 2024, PP 5-11
ISSN 2349-4050 (Online) & ISSN 2349-4042 (Print)
https://doi.org/10.20431/2349-4050.0901002
www.arcjournals.org

An Innovative Framework for Android-Based Applications in Nigerian Higher Education

Aminu Aminu Muazu, Aminu Bishir

Computer Science Department, Faculty of Natural and Applied Science Umaru Musa Yar'adua University Katsina, Nigeria

Corresponding Author:** ***Aminu Aminu Muazu, *Computer Science Department, Faculty of Natural and Applied Science Umaru Musa Yar'adua University Katsina, Nigeria.*

Abstract: *With the recent introduction of smartphones, Android has become one of the most popular operating systems. Different institutions are making a number of attempts to utilize the technology. One such initiative is the creation of mobile quiz applications in higher education with the explicit goal of enhancing the teaching and learning process. Before taking their exams, students will be able to evaluate their level of preparation for their examination. Most Nigerian institutions, however, were left behind, according to studies. With this potential environment in mind, a variety of studies was conducted to find out how it affected higher education students' ability to learn in such an environment made possible by the android platform. Therefore, in this research we developed an android mobile quiz application for students of Nigerian higher institution of learning called QuMISN-App and find out the user response to the application as appendage materials of learning mobile based. QuMISN-App is implemented using Java programming with support from android operating system. Our application's capabilities are encouraging because it produces positive results considering that our data was gathered via a questionnaire which was distributed amongst students of some higher institutions within Nigeria.*

Keyword: *Android Operating system; Application; Mobile Learning; Quiz; Examination*

1. INTRODUCTION

A quiz is referred to as a type of game or mind sport in which participants seek to accurately respond to some questions in order to demonstrate their understanding of the subject matter. Quizzes can be characterized in the educational environment as a method of assessment to evaluate understanding, expansion of information, and abilities or skills acquired in a particular area of study (EuisNursifa Laila Nugraha, Salsabila, 2021). Today, people's mobile phones have surpassed all other technologies as the ones they depend on the most in their everyday activities. Mobile phones have helped much in assisting man to conduct nearly anything related to day-to-day activities, from communication to simple gaming. Numerous initiatives have been made over time to utilize the numerous qualities offered by mobile phones to use them to address a variety of societal issues(Sofian et al., 2021). To address some of the issues the educational sector faces, numerous applications with various goals and objectives have been created such as online exam authentication system conducted by (Alkhateeb, 2020) at Taibah university.

According to (Hooi et al., 2018), mobile learning is a method of instruction that uses portable devices like cell phones, PDAs, laptops, and PCs to give students access to course materials, instructions, and applications without regard to time or place. Mobile learning is also adaptable since it may be modified or updated as the subject matter changes, particularly in the natural sciences where the theory is constantly being refined. In addition to being utilized for self-learning, mobile learning can also be used as a learning resource that is accessible from any location at any time. Similarly, Mobile learning, according to Kukulska (Kukulska-Hulme & Traxler, 2005), is the personalized, networked, and interactive use of handheld computers in schools, in group learning activities while conducting research. Mobile learning technology now makes these novel learning experiences possible, which is made possible by recent developments in mobile technology operating systems, particularly the widely used android operating system (Ajayi et al., 2023).

Android technology breaks down numerous barriers by allowing users to connect with anybody, anywhere, at any time. Android-based smartphones have, as was to be predicted, become a commonplace mode of communication for many individuals, especially among younger age groups like students (Hashim et al., 2023; Joseph, 2021). Due to their lack of access to previously administered exams, students in Nigeria's higher education institutions frequently struggle with the ability to fully prepare for exams. This lack of access to previous questions is a result of the examination process being automated into Computer Based Testing (CBT), which prevents students from receiving a copy of the questions after taking the test. Encouraged by the abovementioned challenges, this paper research recommended the design and implementation of a mobile quiz application for student in higher institution of learning in Nigeria known as QuMISN-App. There are many different mobile technologies and platforms that can be used to develop mobile learning applications; however, android is chosen for this application.

Continuation of the paper is arranged as follows. In Section II, we introduce the related works to this research. In Section III, we explain the methodology of our QuMISN-App. In Section IV, we present our experimental results and provide some discussion. Finally, Section V makes a conclusion and some future recommendations.

2. RELATED WORK

A mobile phone that supports the Android Operating System is referred to as an android phone (Bayissa & Techane, 2023). It is a mobile operating system built on Linux that includes an operating system, middleware, and applications. Android offers developers a free platform on which to build their applications (Zea & Hanebeck, 2021). However, the accomplishments achieved by mobile-based quiz applications have been overwhelmingly positive in both formal and informal sectors, including education (Falana et al., 2021). The mobile phone Quiz Applications have over the recent years, flooded virtually all the app markets we have including Android's Play Store, iOS's Apple Store, Blackberry's BB World, and so on(Yakubu & Aminu, 2023). Noticeably that most practical and educational institutions and daily life use the internet in almost every activity (Aminu Muazu & Umar Audi, 2021). The following works are purely by academics that were carried out each by or for a particular academic institution.

According to a study (Wang et al., 2007) carried out at the Norwegian University of Science and Technology resulted in the creation of the app known as "Lecture Quiz-A Mobile Concepts for Lectures". This tool enables lecturers to give students several quizzes right away following a lecture. It is a mobile application that was created using the J2ME (Java 2 Platform, Micro Edition) technology, which enables the creation of apps for pre-java phones. Multiple users (students) can participate in the application at once and take the tests. The work is online-based and is broken down into a server, a student client, and a teacher client—each of which is a student's mobile phone, or the standalone computer located in every lecture room. The tests are created by the teachers, who then transmit/broadcast them to the students over a network. After being verified, the students can access the questions and give their own answers. A student will only advance to the next round of the quiz session if they successfully answer all of the questions; otherwise, they will be eliminated. The top three students will be identified at the conclusion, and their names and scores are then put on the presentation board. Students may use whatever nickname they like in the quiz instead of their real names to maintain their anonymity. This work's main weakness is that it can only be used in a lecture hall, which means that it does not promote ubiquitous learning.

The University of Tokushima in Japan also created a mobile quiz software to let students learn about other cultures anytime, anywhere, and simply by utilizing their mobile devices. This study assumes that understanding a language's cultural context is essential to learning it, and it also develops a mobile quiz app to make it easier for students to learn foreign languages (Tabata et al., 2009). In order to serve as a tool to guide and assist students in understanding the cultural context of the foreign languages they were learning, which will subsequently help them understand the language better, it was created to allow students to take quizzes and respond to some questions about foreign languages. The quiz app's questions cover a variety of topics, including geography, history, politics, and the culture of the hosts or speakers of the languages that are being targeted. Additionally, it covers fundamental facts about the nation, differences in culture between the target language and the learner's mother tongue, as well as a range of social and cultural concerns related to the language. Its

disadvantage was not just that it was online based, but also that it was not portable because students could only use it while they were inside the school and connected to the local network, which eliminated the opportunity provided by ubiquitous learning environments.

In contrast to the works listed above, the "Stanford Mobile Inquiry-based Learning Environment," developed at Stamford University, creates a mobile application that greatly supports ubiquitous learning by supporting student-created questions (Seol et al., 2011). The effort also created an activity management tool that enables teachers to monitor students' actions at any time. The students' application (SMILE) enables them to formulate questions and distribute them for review and comment from their other students. Three different question kinds are supported by the application: knowledge, comprehension, and analysis. Students can use the text and picture assistance of the Android-based application to support their queries with diagrams. Both mobile and PC users can access and share the content, however the program needs network connectivity. A student can wait for the reviews and comments from the teacher after submitting each question, as well as for the responses from the other students. Each student's score is printed, making it simple to determine who received the highest score. Despite being incredibly portable and widely used, the application is worthless if there isn't strong internet connectivity there (a problem affecting most of the developing countries).

Another study was conducted by certain academics in Egyptian Universities to determine the effect that a mobile quiz will have on students' learning. The Mobile-Quiz Application was developed as a result of study conducted with the help of the Egyptian Ministries of Education and Communication to identify potential methods of using mobile technology into the Egyptian educational system (Elyamany& Yousef, 2013). Consequently, professionals from the Suez Canal Ismailia and the University of Cairo conducted the research. The application, which pioneered the usage of quizzes in Egyptian high schools, enables pupils to take tests on their smartphones. It can be used on devices that support iOS, Android, and Java and was made to function both online and offline. The J2ME (Java 2 Platform, Micro Edition) online application has been developed and put on a local web server where the students connect and take quizzes. Many students in the institutions continue to utilize the application, which was created in 2013 at the University of Suez Canal.

An Android-based system for multiple-choice question tests is called Quizzes (Asghar et al., 2016). It includes multiple-choice questions and answers, along with justifications and examples. The subfields included in this exam include operating systems, database management systems, software engineering, computer networks, digital electronics, and more. Users can use these computer science multiple-choice questions to prepare for a variety of interviews, competitive examinations, admission exams, and other situations. To prepare for any computer field test, try this quiz. In this quiz app, questions are shown along with four options, and in the end, the right answer is also provided. After preparing, students can use the quiz to gauge their level of readiness.

General Computer Knowledge quiz is a collection of multiple-choice questions regarding topics relevant to the computing field that will help you understand the changing nature of competitive examinations. Any computer field test can be prepared for by using this quiz application. Moreover, four options are presented along with each question in this quiz app, and the answer is also provided at the end. As such, students can use the quiz after preparation to measure their degree of exam preparation (Jagran Josh, 2019).

The purpose of a research paper (Punongbayan, 2019) titled "Enhancing Academic Performance in English of Bilaran National High School through a Self-Developed Mobile Quiz Game Application" is to use a self-developed mobile quiz application to assist students at Bilaran National High School perform better academically in English. Since the majority of students struggle academically, especially in English, in their scientific classes. However, research has shown that the application is quite good in teaching both grammar and literary words in English.

The Quiz-Hub (Dyann K. Schmidel, 2023) is an interactive learning quiz game website with a fact-focused theme. There are numerous subcategories in this quiz. It offers users, students, and learners a variety of fields for educational purposes. The categories include Physics, Vocabulary Quiz, Spelling Quiz Game, Vocabulary Quiz, Multiply Fractions, and US History. This quiz requires you to choose the matching pairs; it is not a multiple-choice test.

The lack of mobility, which limits their use to only the local environment of the institutions, is the one issue that virtually all of the works mentioned above share. Another factor that severely restricts the operation of programs is that almost all of them require network connection in one way or another, particularly in locations with poor or nonexistent network connectivity. In order to address these issues, this project will build a framework and implement it as an offline Android application that runs without a network connection. This application can be helpful to students at Nigerian higher education institutions. The application's portability, which enables the targeted users (students) to access it from any location at any time by just installing the app on their mobile devices, will also go a long way toward promoting ubiquitous learning to a significant amount.

3. THE PROPOSED QUMISN-APP

Java programming language is used to build the system and deploy it to an android operating system, unlike other application that used python programming language for detection code fragments (Asmad et al., 2022). Because it offers system portability, Java is the language of choice. This application's framework was created in a way that it solved the majority of the issues that students had when preparing for tests and exams, for instance schools that have adopted CBT. An overview of the QuMISN-App structure is shown in Figure 1 as the use case diagram.

The purpose of QuMISN-App is to have multiple screens, each of which needs to complete a specific task. As depicted in Figure 1, when the application is first launched, the splash screen appears. It remains there for around five seconds before moving on to the login page, depending on whether the user has previously logged on to the application or not and then the main menu screen. From the main menu, the user can access the Help Screen, where thorough instructions on how to use the application are offered, the About Screen, which contains information about the application itself, or the Quiz Screen, where the user can opt to take a quiz by picking just one course at a time. Only two of the nearly universally offered courses in Nigerian universities—the GSP and EDS—have we adopted in this instance. Normally, all students enrolled in and registered for these courses during their first year because they are thought of as general education courses.

The Splash screen is the first screen that appears when an application is launched. This screen functions as the welcome screen when the user first opens the application. It won't take long before a new screen appears in lieu of the existing one. The next that will appear is based on the current history of the user in using the application. If it is the first time, he/she is launching the application, the user will be taken to login screen and then to Main menu screen. If it is the first time the user launches the application, he/she will be required to fill in the login form. The login form requires the user to input his/her school email, username, and a password. These details will be saved in the database for use in the subsequent launches and for personalization purposes.

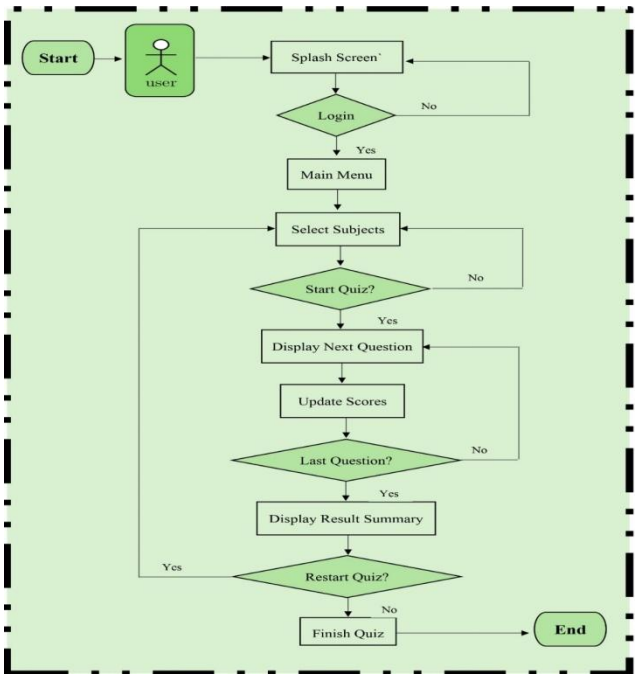

Figure1. *Flow diagram of QuMISN-App*

After logging on to the application successfully, the user will immediately be taken to the Main menu screen, which offers access to all of the application's sections. It consists of buttons that are used to move between and navigate to the various application sections. By hitting the GSP button, for instance, the user will be taken to the GSP Courses available in Nigerian Universities where he or she can select a subject for which they want to take a quiz. Likewise, pressing the EDS button would take the user directly to EDS. If the user selects a course (either GSP or EDS) he/she will be taken directly to the Test screen. This screen is composed of a pointer that indicates the current question being answered out of the total, the question and then the options for each of the questions. It also contains a Next button which takes the user to the next question. The user will continually be transferred to the score summary screen after completing the quiz to view a summary of the outcomes for the questions they attempted. As a final step, the application is able to display an overview of all incorrect responses together with the questions that were missed and then if the user wants to retake the quiz from the same subject or different subject.

4. Experimental Results and Discussion

For the evaluation of our QuMISN-App's performance as shown from Figure 2, we divided some of our students into two categories. The first group was instructed to use small or low-end Android smartphones, whereas the second group was instructed to use high-end Android smartphones. To find any performance challenges or inconsistencies between low-end and high-end phones, this choice was made. The following questions had to be answered for each step while the students installed and used the app on their smartphones; Installation time (sec): How many seconds did it take them to install the app?, Load time (sec): What is the loading time of the first screen (splash screen)?, and Transition time (sec): On average, how many seconds did it take them to transition from one screen to another?

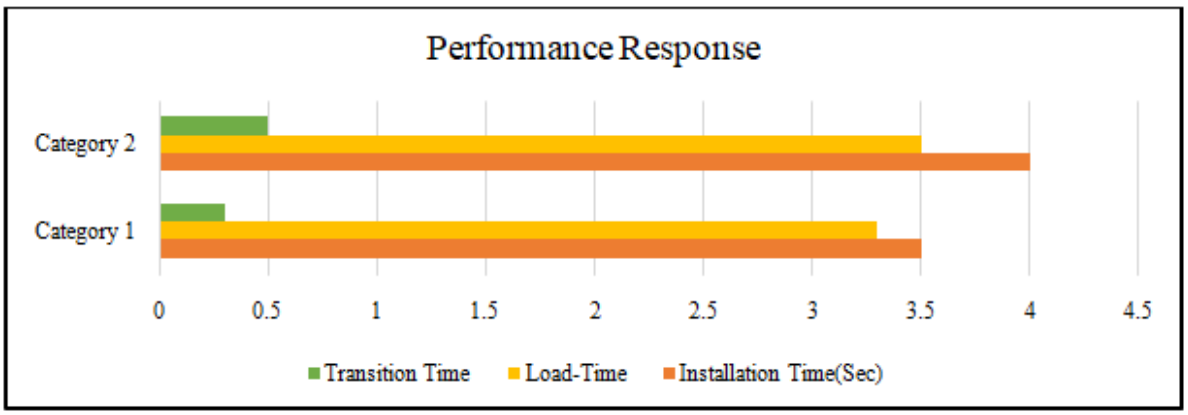

Figure2. *Student response on performance*

Furthermore, a questionnaire was created and distributed to the students regarding the applicability and necessity of the recently developed system. They fully appreciated it and tagged it as a "welcome development". The questionnaire is designed and taken online (using google form) so as to make it very easy to share and also to gather the results, considering the number of the targeted users (students). The summary of the responses as presented in Figure 3 shows thatthe majority of the students accepted the system.

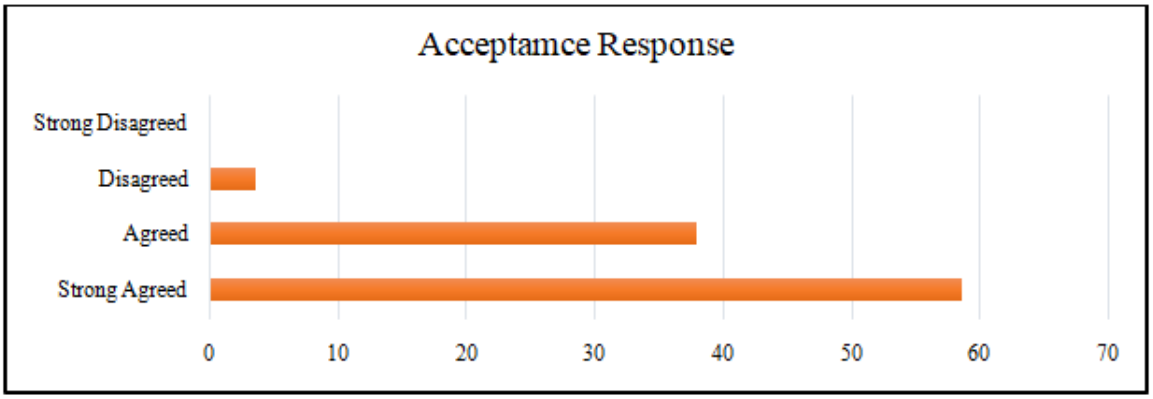

Figure3. *Percentage of the amount (Naira) being spent per semester.*

As a final point, it is clearly shown that the majority of the students can use this application since most of them spent more money each semester for the purpose of photocopying past question papers. According to the result in Figure 4, more than 90% of the respondents believe that this automated system will be more efficient and effective than the old manual system.

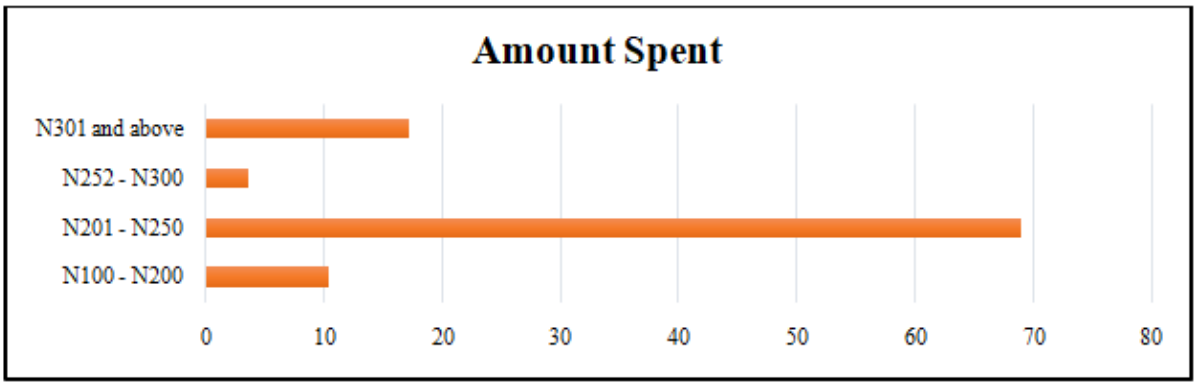

Figure4. *Acceptance of the new system*

5. CONCLUSION

This paper developed a newly mobile quiz application in android operating system for student of higher institution in Nigeria named QuMISN-App. Our evaluations have demonstrated that our mobile app produces good results that the system will be more efficient and effective than the old manual system. However, there is still opportunity for advancement of this research. Such as other courses offered at all Nigerian universities might be added, and course materials could be integrated into the application.

REFERENCES

[1] Ajayi, A., Olajide, M. S., Afolabi, O. P., & Abiodun, O. A. (2023). Evaluation of Phishing Attack Strategies on Mobile Device Users. International Journal of Computer and Information Technology(2279-0764), 12(1). https://doi.org/10.24203/ijcit.v12i1.312

[2] Alkhateeb, J. H. (2020). A Novel Framework for Ensuring Online Exam Authentication at Taibah University. INTERNATIONAL JOURNAL OF SOFTWARE ENGINEERING & COMPUTER SYSTEMS (IJSECS) ,6, 1–7. https://doi.org/10.15282/ijsecs.6.1.2020.1.0064

[3] Aminu Muazu, A., & Umar Audi, I. (2021). Network Configuration by Utilizing Cisco Technologies with Proper Segmentation of Broadcast Domain in FNAS-UMYUK Nigeria. Journal of Network Security and Data Mining, 4(1), 1–13. https://doi.org/10.5281/zenodo.4776375

[4] Asghar, M. Z., Khan, D. I., Sana, I., Nasir, K., Iqbal, H., Fazal, P., Kundi, M., & Ismail, S. (2016). Quizzes: Quiz Application Development Using Android-Based MIT APP Inventor Platform. In IJACSA) International Journal of Advanced Computer Science and Applications (Vol. 7, Issue 5). www.ijacsa.thesai.org

[5] Asmad, I. N. A., Mubarak Ali, A.-F., & Jailani, N. I. S. I. (2022). ENHANCEMENT OF GENERIC CODE CLONE DETECTION MODEL FOR PYTHON APPLICATION. International Journal of Software Engineering and Computer Systems, 8(1), 1–10. https://doi.org/10.15282/ijsecs.8.1.2022.1.0091

[6] Bayissa, M. W., & Techane, D. (2023). Multi-Lingual Mobile Application to Improve the Pharmaceutical Care of Patients in Ethiopia. International Journal of Computer and Information Technology(2279-0764), 11(5). https://doi.org/10.24203/ijcit.v11i5.290

[7] Dyann K. Schmidel. (2023). Interactive Learning Quiz Games Focused on Essential K-12 Facts. Https://Quizhub.Com/.

[8] Elyamany, H. F., & Yousef, A. H. (2013). A mobile-quiz application in Egypt. Proceedings - 2013 4th International Conference on e-Learning Best Practices in Management, Design and Development of e-Courses: Standards of Excellence and Creativity, ECONF 2013. https://doi.org/10.1109/ECONF.2013.43

[9] Euis Nursifa Laila Nugraha, Salsabila, T. S. R. (2021). Implementing Online Quiz Application in EFL Classroom. Implementing Online Quiz Application in Efl Classroom, 15(10).

[10] Falana, O. J., Ebo, I. O., Akinwunmi, O., & Odom, I. O. (2021). Se-LMS: Secured learning management systems for smart school. INTERNATIONAL JOURNAL OF SOFTWARE ENGINEERING & COMPUTER SYSTEMS (IJSECS), 7(1), 36–46. https://doi.org/https://doi.org/10.15282/ijsecs.7.1.2021.4.0080

[11] Hashim, A. S., Aminu Muazu, A., Yusof, M. A. M., & Arshad, N. I. (2023). Development of Robot to Improve Learning of Programming Skills among Students. Iraqi Journal for Computer Science and Mathematics, 4(3). https://doi.org/10.52866/ijcsm.2023.02.03.001

[12] Hooi, Y. K., Shafee Kalid, K., &Tachmammedov, S. (2018). MULTI-FACTOR ATTENDANCE AUTHENTICATION SYSTEM. International Journal of Software Engineering and Computer Systems, 4(2), 62–79. https://doi.org/10.15282/ijsecs.4.2.2018.5.0049

[13] Jagran Josh. (2019). Computer General Knowledge Quiz. Https://Www.Jagranjosh.Com/Articles/ Computer-General-Knowledge-Quiz-1315979215-1.

[14] Joseph, E. C. (2021). Development of an Android Mobile App for Real Time Maize Stem Borers Monitoring in Precision Farming. International Journal of Computer and Information Technology(2279-0764), 10(6). https://doi.org/10.24203/ijcit.v10i6.181

[15] Kukulska-Hulme, A., & Traxler, J. (2005). Mobile learning: A handbook for educators and trainers. In Mobile Learning: A Handbook for Educators and Trainers. https://doi.org/10.4324/9780203003428

[16] Punongbayan, A. B. (2019). Enhancing Academic Performance in English of Bilaran National High School through a Self-Developed Mobile Quiz Game Application. Instabright International Journal of Multidisciplinary Research, 1(1). https://doi.org/10.52877/instabright.001.01.0001

[17] Seol, S., Sharp, A., & Kim, P. (2011). Stanford Mobile Inquiry-based Learning Environment (SMILE): using mobile phones to promote student inquires in the elementary classroom. FECS 2011 : Proceedings of the 2011 International Conference on Frontiers in Education : Computer Science & Computer Engineering (Las Vegas NV, July 18-21, 2011), 270–276.

[18] Sofian, N. M., Sobri Hashim, A., & Sarlan, A. (2021). Multimedia Elements in Designing Mobile App Interface for Autistic Children: Proxy User Perspective. Proceedings - International Conference on Computer and Information Sciences: Sustaining Tomorrow with Digital Innovation, ICCOINS 2021. https://doi.org/10.1109/ICCOINS49721.2021.9497180

[19] Tabata, Y., Yin, C., Ogata, H., & Yano, Y. (2009). Mobile phone-based quiz system for learning foreign culture. Proceedings of the 17th International Conference on Computers in Education, ICCE 2009.

[20] Wang, A. I., Øfsdahl, T., & Mørch-Storstein, O. K. (2007). Lecture quiz -a mobile game concept for lectures. Proceedings of the 11th IASTED International Conference on Software Engineering and Applications, SEA 2007.

[21] Yakubu, M. M., & Aminu, A. M. (2023). Challenges and Prospects of Marketing Nigerian-Made Computer Software: A Study on Attitudes and Marketability. UMYU Scientifica, 2(3), 27–33.

[22] Zea, A., &Hanebeck, U. D. (2021). iviz: A ROS visualization app for mobile devices. Software Impacts, 8. https://doi.org/10.1016/j.simpa.2021.100057

Citation: *Aminu Aminu Muazu & Aminu Bishir,(2024). An Innovative Framework for Android-Based Applications in Nigerian Higher Education. "International Journal of Innovative Research in Electronics and Communications (IJIREC), vol 9, no. 1, 2024, pp. 5-11. DOI: https://doi.org/10.20431/2349- 4050.100 3002.*