# Mobile Application Platform Support System for E-learning Management Systems

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*Abstract— Mobile application integration into e-learning systems to support report and assessment across multiple platforms for giving feedbacks is of crucial importance in the educational sector. Many institutions delay in generating reports for their students and this affects how rapid decision is made in terms of assessing their performance both by the institution and their parents. Access to mobile digital devices with platform supports for e-learning are limited developed high bandwidth telecommunications infrastructures leaving the remaining unconnected and less access to interactions with such system. And also there are still a number of educational institutions who do not host their results online, prepare or give school results in a conventional manner. Most of them use a number of software and database to prepare their results but do not provide feedbacks in forms easily accessible to students from different geographical areas with different access telecommunications services. To solve the above stated problem, this work provided the stages of design and development of online result portal system to support timely, effective and easily accessible feedbacks. The system manages student academic records and generates reports for analysis on student performance and feedbacks for students, parents etc. This system has both online and offline capabilities with regards to internet and this made it suitable for both rural and urban usage for various schools. The portal system provides instant access to academic reports as well as platform for reports generation.*

*Keywords— e-learning system, information systems, mobile applications.*

## I.   INTRODUCTION

E-learning systems are playing a very crucial role in the way we deliver lessons and give feedbacks in our educational systems today. This has changed the way studies are being done due to the engagement of digitization and adoption of multimedia tools in delivering live lectures etc. With all these engagements of massive online open courseware systems and e-learning platforms, only a digital section of our society with better access to certain telecommunication services have engaged in the adoption and seems to benefit from the engagement of e-learning tools with dynamic content capabilities. These are those with higher accessibility to constant power supply and high bandwidth   network infrastructure and further with access to devices with capabilities to support web2.0 technologies. Even though learning systems are preferred today in hybrid forms than to pure e-learning delivery based on the subject being taught and in general, the aforementioned factors such as accessibility to such technologies with web2.0 capabilities does not exist in most environments such as the rural areas where the  telecommunications sector provide only SMS and voice services. Hence for some services for most e-learning systems needs a cross platform approach to facilitate interoperability between these applications, so that a cross platform operations can be effectively deployable such as students getting their grades as SMS services, payment of fees via mobile money services, parents accessing reports on students via mobile services, chats assessable via SMS, app services etc. Hence in our approach, we integrated our system such that report services and other forms of feedbacks can be accessible using disparate devices.

## II.   LITERATURE REVIEW

E-Learning can be informally defined as a software solution for educational purposes, which is based on theoretical postulates, trends in cognitive science, artificial intelligence, and pedagogy. The Learning Management System approach in formal education formed a basis for a reliable eLearning platform that complied with standards and best practices they are recommended by respectable educational and corporate stakeholders in the growing eLearning market [1]. Such a solution is used in educational departments for the design and implementation phase of courses that support classroom training [2].

E-learning has been undergoing transformations from its existence in terms of its adaptation and integration of new technologies as well the factoring in of the needs of the learner. It has emerged from being a radical idea---the effectiveness of which was yet to be proven---to something that is widely regarded as mainstream for supporting desson delivery. It is the core to numerous business plans and a service offered by most colleges and universities. And now, e-learning has been evolving with the World Wide Web as a whole [3]. With regards to higher education, more and more data are available on the demand for electronically delivered higher education, or e-higher education. Market research

findings tend to be held tightly by market researchers and their clients. Data are available in the public domain but demand for higher education has been on the increase and as well as demand for e-higher education [2]. The rapid integration of different platforms to support different devices and teaching methods in the academic environment is a challenge within the field of information technology due to rapidly evolving technologies. In the field of e-learning, where learning management systems are used for courses development, their integration with other platforms and applications are becoming interesting, in particular with digital repositories [4].

Díaz, Francisco Javier, et al. in their work described the integration of Moodle with the DSpace repository. The integration process consisted of two stages, in order to establish full communication to and from the repository. The communication from Moodle to the repository was achieved by transferring elements. Their new stage implemented a specific module in order to establish communication in the other direction and allow transferring resources from the LMS to the repository. The module became very useful for educational material that can be made publicly available through a repository and thus transcending the borders of an educational environment [5].

The engagement of eLearning in most classrooms nowadays with the most common one, Moodle, has changed the learning and teaching experiences of both the student and the teacher respectively. After years of the application of learming management systems in classrooms, teaching practice, there has been growing concerned about the student communication and feedback habits with these systems. In the work of Hölbl, M., and T. Welzer, they presented the experiences and results of a questionnaire regarding Moodle and eLearning. They analysed the communications capabilities of Moodle. They further presented an analysis of students' feedback habits using Moodle regarding the grading of teachers, teaching assistants and the course in general and also investigated student's general opinion on eLearning and experiences with technical problem when using Moodle[6] .

From the work of [6] they analysed student usage of Moodle's communication capabilities. Unfortunately, it was noticeable that students are not as prepared and eager as their lecturers to use communication capabilities in Moodle, particularly advanced web 2.0 communication elements like forums, chats, blogs, and wikis. One of the results is shown in the graph in figure one below. Most of these elements are in high percentage unused by the students assessed students. The reasons for such behaviour of students were found out to be different. A fairly high percentage of students claim that they were now familiar with the specific communication capabilities. This was rather unexpected since the same capabilities were used by students daily at other web pages (e.g. at the faculty's web page). Other reasons why students do not use communication capabilities included lack of time or simply that they do not want to use them [6].
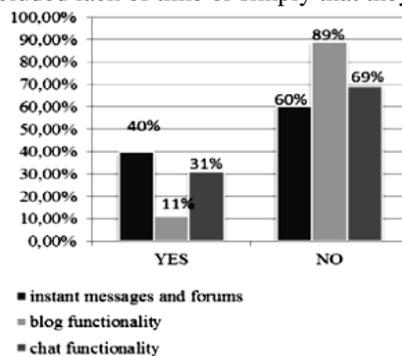


Fig. 1 Usage of Moodle's communication capabilities

In providing an effective platform for feedback on results via services such as SMS etc we proposed a system that manages student academic records and generates reports for analysis on student performance and feedbacks for parents, students in SMS chat forums, etc. This system has both online and offline capabilities with regards to internet and this made it suitable for both rural and urban usage for various schools. The portal system provides instant access to academic reports as well as platform for reports generation. Other forms of work such as [7-12] also built comprehensive e-learning systems.

### III. THE APPROACH

The engagement of rapid application development process was used with sequential design process of software development that covered phases of conception, Initiation, Analysis, Design, Construction, Testing, Implementation, and Maintenance. We gave out questionnaires to students to get feedbacks into our development process to help in data formalization and end user understanding. The questionnaires were mainly structured with both open and closed question. Direct observations of processes were done as well.

The functional requirements of the system defined the internal workings of the system: that is the calculations, technical details, data manipulation and processing, and other specific functionality or services that the system is expected to provide. Below are some functional requirements of the system.

The system has the capability to:
- Allow users to create account
- Capture information about the users
- Generate Report
- Process SMS messages

The Non-functional requirements engaged were not really functions of the system but they were needed to aid the system to run safely. The non-functional does not really have an impact on the software but rather needs its services. Those requirements are Appearance, Usability, Reliability, Performance, Authorization, and Security.

- Appearance: The graphic design of the system has to be the same in the whole application.
- Usability: The extent to which a system can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use
- Performance: to ensure an effective functioning of the system
- Reliability: the ability of a system or component to perform its required functions under stated conditions for a specified period of time.
- Security: The system prevents unauthorized users to access the system. Authorized users are provided with user id and passwords. In order to achieve high level of security, the password is encrypted. Data confidentiality is also provided through the same means.

Software programs that help us in order to achieved a task
- Operating systems e.g. windows 7, vista, X.P
- Notepad ++
- HTML
- C.S.S
- PHP
- XAMP SERVER

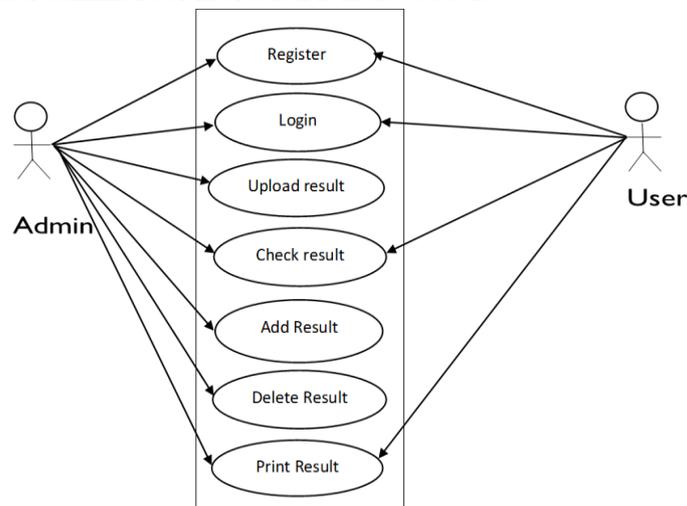The use case diagram of user administrator interaction is indicated below.



Fig. 2 Use Case Diagram

## IV. RESULTS AND DISCUSSIONS

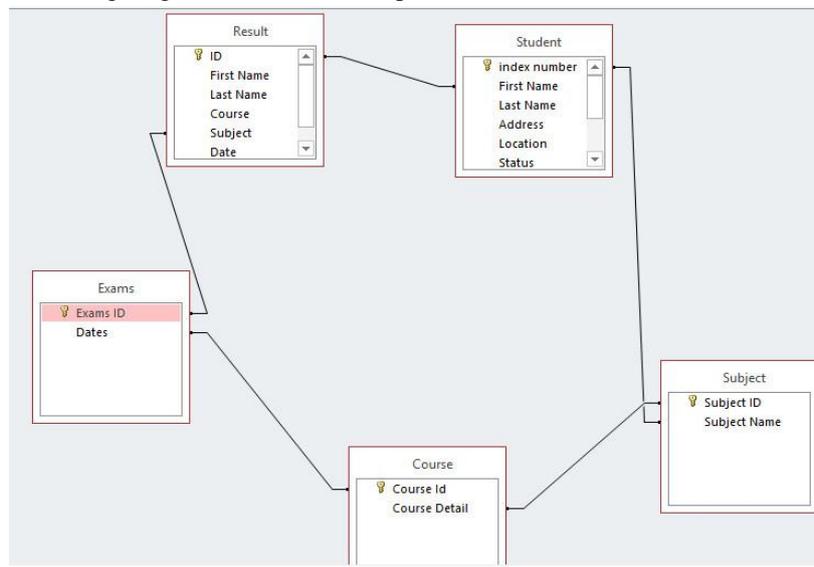The entity relational-modeling diagram obtain from sample database is shown below.



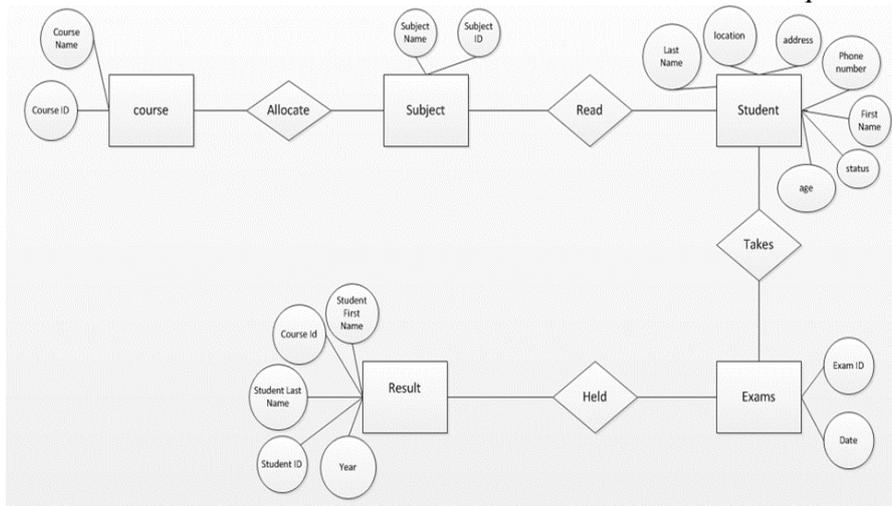Fig.3 Relationships diagram of tables.

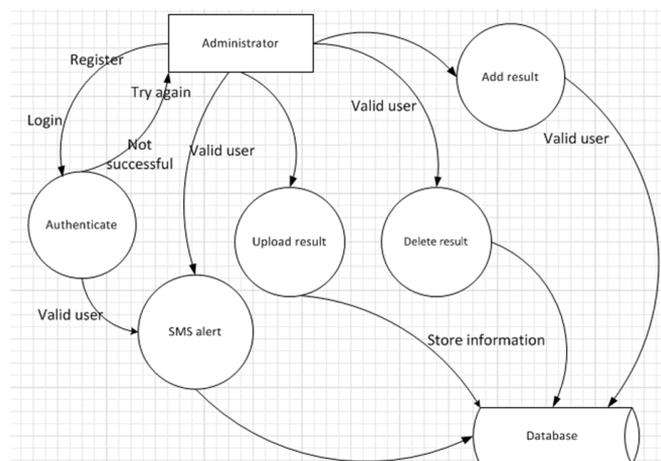Fig.4 Entity Relationships diagram of table.



Fig.5 Admin Dataflow Diagram

Under this process, administrator must register him/herself in order to get a valid password so as to login. When he finished the registration, he is supposed to login so as to upload, create, and delete the result onto the server.
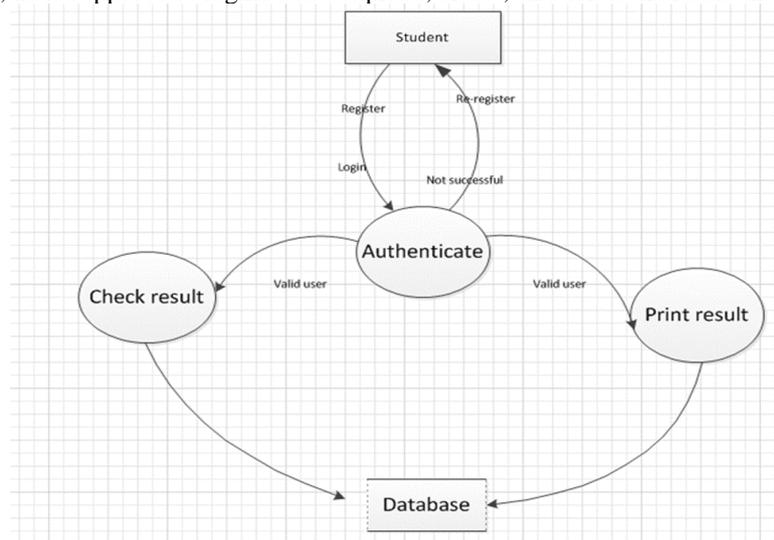


Fig.6 Student Dataflow Diagram

SMS stands for short message service. The service allows for short text messages to be sent from one cell phone to another cell phone or from the Web to another cell phone and also from the phone to the forum of discussion. The SMS server receives SMS messages from the users and processes the message by connecting to the database that holds the details such as grades, forums, etc. The SMS server receives all SMS via the GSM terminal connected to the computer, it then connects to the database to authenticate the user and query for the results via the appropriate database connector like Open Database Connectivity (ODBC). To request a result, the user sends his index number or matriculation number,

along with a Password (for security and privacy) to the designated number. Students can include specific details like the class and course for which they want to check their result. In request for a full (with the breakdown) or a brief reply, the application queries the database and filters out the user's result appropriately after which it sends the examination result back to the user through the GSM terminal as shown in Figure below.
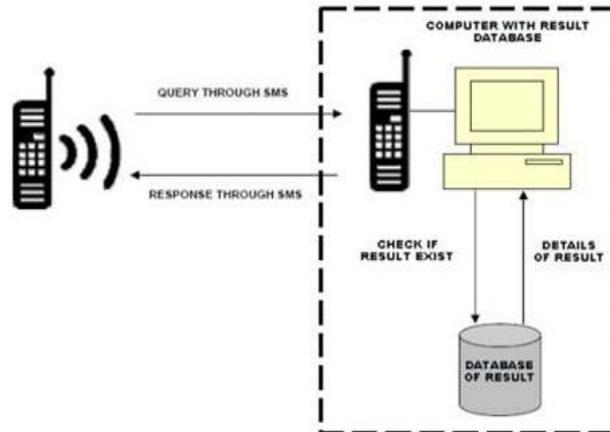


Fig.7 S.M.S Architecture

The system architecture or systems architecture of the conceptual model that defines the structure, behaviour, and more views of the system with the SMS capability is shown above. The architecture description below is a formal description and representation of the system which is organized in a way that it entails some elements that supports reasoning about the structures of the system. Here the web server was connected to a database which contains the information of each student. The web server store and retrieve data through the website whereby the admin have a full right and privileges. He can add, delete, edit to the website as well as updating the results. The user registers and login before getting access to the website. Once the result are out the user will be inform by getting an SMS alert on his phone. When click on the link on his phone this will take him/her to the webpage whereby after registration, he/she login to check and print his/her result. Below there is a figure showing how the system will work.
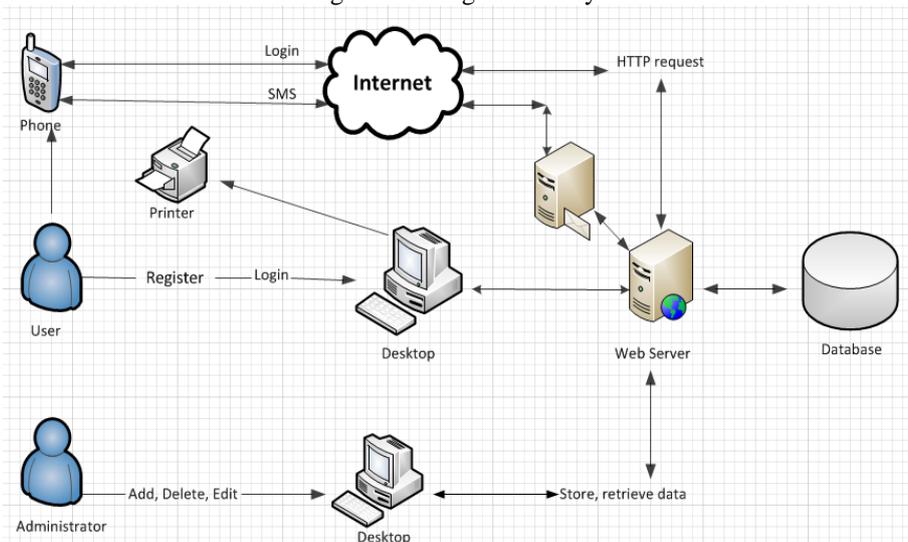


Fig.8 system architecture



Fig.9 Administrator Registration Page      Fig.10 Student Registration/Login Page

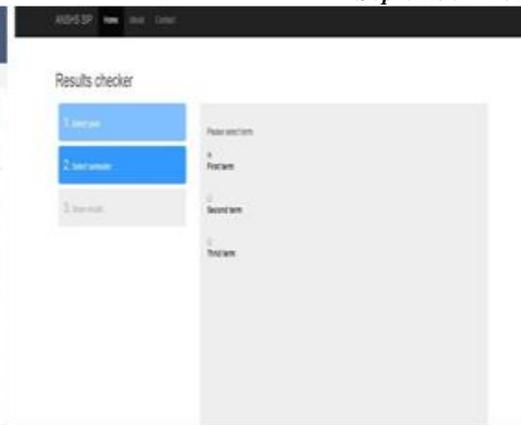Fig.11 Administrator Dash Board Figure          Fig.12 Student Result Form



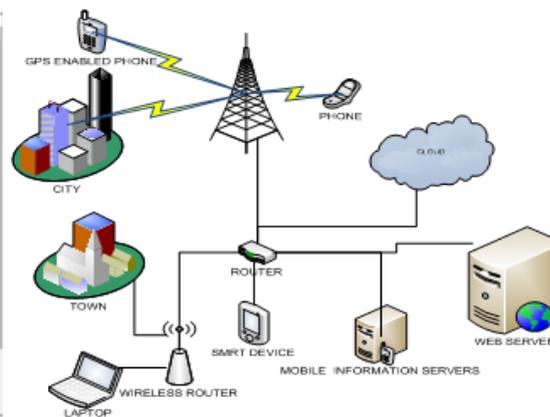Fig.13 Student Result Form          Fig.14 Depiction of the network environment

The above figures represented the interfaces of some of the developed system and the depiction of of the network environment of which the system was deployed and tested.

## V. CONCLUSIONS

The final application has capabilities of processing messages from SMS services to forums, alert students on assignments, take feedbacks to and from students. The System also disseminates information to parents/guardians to get information on student progress and special needs by engaging holistic new approaches of parent's involvement in guidance and counseling process of the student. The system bridges the gaps between disparate applications communications. Students in rural communities as well as parents who do not have access to smart phones can also obtain some level of feedbacks and reports from the built system.

## REFERENCES

[1]  Georgouli K., Skalkidis I., and Guerreiro P. A Framework for Adopting LMS to Introduce e–Learning in a Traditional Course // Educational Technology & Society, 2008. – Vol. 11. – No. 2. – P. 227–240.

[2]  Budimac Z., Putnik Z., Ivanović M., Bothe K., and Schützler K. On the Assessment and Self–Assessment in a Students Teamwork Based Course on Software Engineering // Computer Applications in Engineering Education. – Wiley Periodicals, Inc., A Wiley Company, 2009.

[3]  Downes, S. (2005). Feature: E-learning 2.0. Elearn magazine, 1.

[4]  Olsen, A. J. (2015). E-learning in Asia: Supply and Demand. International Higher Education, (30).

[5]  Díaz, Francisco Javier, et al. "Integrating a learning management system with a student assignments digital repository: a case study." International Journal of Continuing Engineering Education and Life Long Learning 25.2 (2015): 138-150.

[6]  Hölbl, M., and T. Welzer. "Students' feedback and communication habits using Moodle." Elektronika ir Elektrotechnika 102.6 (2015): 63-66.

[7]  Clark, R. C., & Mayer, R. E. (2011). E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning. John Wiley & Sons.

[8]  Welsh, E. T., Wanberg, C. R., Brown, K. G., & Simmering, M. J. (2003). E-learning: emerging uses, empirical results and future directions. International Journal of Training and Development, 7(4), 245-258.

[9]     El Tantawi, M. M., Abdelsalam, M. M., Mourady, A. M., & Elrifae, I. M. (2015). e-Assessment in a Limited-Resources Dental School Using an Open-Source Learning Management System. Journal of dental education, 79(5), 571-583.

[10]    Chang, S. Y., & Shen, C. Y. (2015, June). The Effect of Usability of Learning Management System on Student's Flow Experience and Learning Experience. In EdMedia: World Conference on Educational Media and Technology (Vol. 2015, No. 1, pp. 661-665).

[11]    Pandiyan, B. M., & Singhal, M. (2015). Development of a Lightweight Learning Management System using Open Source Software Drupal. Journal of Current Trends in Library and Information Science, 1(1), 1-5.

[12]    Murai, H., Ura, K., Suehiro, N., Yaegashi, R., Imai, Y., Saisho, K., & Hayashi, T. (2015, June). A study of load-balancing strategy based on students' action on university cooperative e-Learning. In Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing (SNPD), 2015 16th IEEE/ACIS International Conference on (pp. 1-4). IEEE.