ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 7, Issue 6, June 2020

mLMS: An Interactive Android Application for Educational Sector

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Abstract: With the advanced development of mobile technology and an increasing amount of wireless mobile devices create a new acronym known as Mobile Learning (M-Learning). It provides more flexibility and interactivity to the learners and tutors in the educational activity. In this paper, we implement the M-Learning integrated with the Learning Management System (LMS) in an Android Platform. M-Learning is considered as an indispensable learning tool in the future. The proposed model contains numerous functions such as course creation, user management, course section, online exams, online classes, doubt clarification, and so on. The learner can learn courses from anywhere, and at any time without any constraints. The proposed model is designed as that the learners get a notification when updates are done in the system. It also contains quiz type questions that enable the learners to develop their skills in a fast manner. Compared to traditional learning methods, the M-Learning enhances the learner's skills and optimize the working skill of them. The proposed framework also supports collaborative learning which creates a knowledge sharing among the co-learners. Finally, the application is developed based on three modules such as Admin, trainers, learners. This framework provides good operability and optimism for learners and the educational system.

Keywords: Collaborative Learning, Learning Management System (LMS), M-Learning Application.

I. INTRODUCTION

By utilizing mobile devices, learners can create their own pace and time for the learning process. Partly due to this characteristic, M-Learning is considered as one of the most popular learning methods among the learners compare to all other internet learning methods. It has also become a prominent learning method for internet users. The designing and development of the M-Learning framework based on the Pedagogical principle and blending learning which make the framework to enhance its performance among the learners. Thereby it levels up the virtual environment to the students. Along with the fast pace of development for mobile devices, digital natives (or new millennium learners) have opportunities to study in personalized learning environments to effectively acquire knowledge and skills. Education providers have invested enormous resources in engaging students and enhancing learning experiences through m-learning. Learners can effectively and efficiently generate new knowledge and skills in entrepreneurship by interacting with educational apps on Android OS. In the case of nascent entrepreneurs who are involved in business creation, their prioritization is to focus on establishing a long-term relationship with partners and avoiding any impasse with other stakeholders to successfully start their business. Android is developed in the Linux based platform and is primarily designed for the touch screen mobile such as smartphones and tablets computers. It has rich sources of hardware and software applications in it. It supports different network protocols and it is an open-source tool. The developers can easily access the Application Programmable Interface (API) framework. Education providers investing more resources to enhance the student's/learners educational skills. The learners can easily interact with the educational application designed in the Android platform for improving their skills. Learning management system (LMS) is the software or tool which provides the learning content to learners through integration with the M-Learning Application. It supports the learners to take online quizzes, submit and get assignments from the tutors, download online courses in video or audio format. The quality of the M-Learning is analyzed based on system quality, service quality, user satisfaction.

The paper is organized as follows, the literary works are reviewed in section II, our proposed model is explained clearly in section III, the experimental results and discussion are discussed in section IV, and at last in section V described the conclusion part.

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ISSN 2394-3777 (Print)
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II. LITERATURE REVIEW

Wei et al [1], proposed a paper where he solved the problem of M-Learning. Gisela et al [2] presented a paper where MLEA is developed on the Android Platform. He designed an application that implements computational techniques such as web services, mobile computational techniques. It provides communication between learning content and mobile devices. It provides some features such as alerts, file downloads, calendars, and others. Li et al [3], proposed a paper where open-source Open Stack platform for the cloud computing environment. The system consists of three parts such as a client who views the content, tutors and service provider which enables the quiz content in the cloud computing platform. Creating an interactive environment, the Android Wi-Fi is combined with the cloud computing platform for e-Learning as a SaaS service. Paolo et al [4], presented a paper where he discussed the security problem. A vast amount of data is shared with the learners from the educational center, it may be easily affected by cyber-crime and sophisticated attacks are high. A visualized technique is applied to the data set which is generated by the DREBIN. It is a malware detected tool that analysis the Android application after installation. Navarro et al [5], proposed a paper to improve the quality of the M-Learning. They created a framework that supports different models. Christian et al [6], presented a paper where evaluate the framework of M-Learning, analyzed the pedagogical usability and user interface usability. Based on this analysis the system improves the quality factor of the application. Matetic et al [7], implemented an Artificial Neural Network in the Learning Management system. It is used to evaluate the improvement in the learning process. Charles et al [8], evaluate the quantitative and qualitative strategies in the Learning Management system. The equation model and thematic analysis are processed for the analysis purpose. Henry et al [9] proposed a paper based on the M-Learning where she implemented the Unified Theory of Acceptance and Use of Technology (UTAUT2) and Trust Model for learning purposes.Septia et al [10] presented a paper where he implemented the gamification framework model for learning. This process applies the game in the learning process thereby create an interest among the tutors and learners for designing and learning. It maximizes the feeling of enjoyment and involvement.

III. PROPOSED SYSTEM

The proposed architecture is depicted in Fig.1. The overall view of the proposed model is the mobile devices are used to assess the M-Learning Application which is installed in it. The learners can utilize it for their learning purpose. It is highly user friendly for the learners. The M-Learning is integrated with the Learning Management System (LMS) which acts as the backend server for the model. It serves the learning content to the learners. Based on the learner's request the LMS transfer the learning content to the Application which is stored in the Test content server. The Mobile middleware act the medium between the content and user database.

Fig.1.Architecture Model of Proposed System

Mobile Learning content can be access from anywhere at any time regardless of device. It provides micro-learning to the learners which are bite-sized learning content. The learners can learn very fast with the user flashcards and modules. For a detailed analysis of the learning content, the framework provides some hyperlinks. The statistical report and graphs are plotted based on the learner's performance. It is monitored by the tutors and they can share their experience with the learners to improvise their learner's performance. Aforementioned that the model is integrated with the LMS which analysis the learning content and provides a drawback of the structure based on the learner's participation.

A. *Mobile Adaptive Test Server*

The LMS software is directly installed in the hard drive. The LMS users are categories into two types such as the learners who took online courses, the M-Learning team who disburse the learning content and update the learning content. The LMS is utilized globally and data are stored in the cloud. The administrator is responsible for adding

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ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

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Vol. 7, Issue 6, June 2020

courses, updating courses, learning plans and tracking their learners. The learners are the receivers who view the learning content and utilized it for improving their skills. The learners can view their course catalog, complete assigned courses and they can measure their progress. The learners were allotted with the training based on their preferences. The devices send a request to the LMS system through M-learning Application where those request initially transfer to the API adapter which allows the programs to communicate with the LMS program. If the request is not transferred properly it sends the error message to the device, it is a bidirectional one. After the API, Adapter sends the data request to the tracking service where the particular content is tracked through Sharable Content Object Reference Model (SCORM) tracking data. SCORM creates the online training materials which get shared among the systems.

It provides a way to share the content among the different systems where the content and context can be reused through SCORM. SCORM is an essential tool that supports online-based training. Once the content was created then it can be utilized in the different systems without any modification. This makes the content to sell at a very fast rate at a low price. If the data was not found it provides an error message to the API. Then in the sequencing service of LMS sequence the content properly and send it to the testing/assessment service, content management service, and delivery service. In testing /assessment service it collects the data regarding the particular content where test and assessment questions are initialized. In course Administration service the learner profile is checked and the course will design based on the learner profile. The assessment/test, learning content for a particular course will be designed automatically based on the learner profile details. After that, the data will be retrieved from the local or remote repositories. Then the complete package will be delivered to the end-user through the delivery service. The learner will get the course in a well-organized and structured manner. Based on their interoperable standard, a supportive learning content package is enabled such as SCORMS. The content marketplace provides content where they can access, browse and purchase the course in the learning platform. To encourage the learners a Gamification based module is in-built which makes the learners achieve points, badges, and awards,etc.. It supports social learning where collaboration, peer mentorship, discussion, and knowledge curation encourages. The Repositories contains all the learner's details and learning content details. The learners use mobile phones for accessing their online courses. The Learners provide a request to the LMS through an internet connection. The Content Management system is a software where the admin can create, manage and modify the content in the application without any specialized technical knowledge. The learner can directly interact with the application. The proposed model is designed as that it can modify the content as per the connected devices. Based on the learner's device the learning content also adapted. The data are shared from the Learning Management system (LMS) to the learners. The corresponding response is provided to the learners. The device can visualize the different modules which in-built in the M-Learning Application. Based on the student/learner performance the system will track and manage the learner data. Many training institutions rely on the LMS for easy access for analyzing and maintaining the content and student records. The Learning Content Management System (LCMS) is a combination of LMS and CMS. LCMS focused on the learning content but it doesn't track the progress or invite the users and hand over the certificate to the user which is normally done by the LMS. Instructional designer normally uses this LCMS software to create, store and organize the e-learning content. This software allows creating and modifying the course content for individual learners. Consider LMS user is the learner and LCMS is the learning content creator. In LCMS the developer can store and retrieve the old version of the courses from the database. Through this LCMS, the developer can use the authority tools and content repository components separately this will reduce the relaying the LMS component of the system. It is necessary to monitor the user adaptability for the platform, because sometime some issues may occur due to these adaptability problems due to the mobile terminals, learning content, etc. If the adaptability of the application is good then it provides the advantage of the capability of the mobile device to interact with the learning content and enables the user to access the numerous files/data from the M-learning system.

B. *Mobile Middleware*

The mobile middleware is used as the context of the learning in devices. It provides numerous transparency which hides the complexity of the mobile environment. It provides different services such as messaging, resource discovery, Remote Procedure Call (RPC), storage services and data synchronization.

- Compared to the traditional methods of learning, the M-Learning provides an innovative multimedia-based content which creates more interactive than the normal multiple choices.

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ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 7, Issue 6, June 2020

- The questions are generated in a random manner where based on the previous answer of the learners, the questions are set in an easy, medium or difficult manner which is far better than the conventional test.
- By checking the answers to the questions, the system modified the questions which cause the learners to interact more than the normal one.

The Mobile Adaptive Test (MAT) is implemented on the Android platform with some instruction and technical environment. This overall system contains the following factors, they are Multimedia Test Content, Test format, and presentation for various mobile devices, Adaptive Test, Question Sequencing based on the performance level, and Test Performance Feedback. The MAT Server retrieve the questions from the LMS. To take the test the user needs an account, a validation is displayed to take a test. After login, the questions are transferred from the server and each next answer is designed based on the Computer Adaptive Test (CAT). [8] discussed about a project, in this project an automatic meter reading system is designed using GSM Technology. The embedded micro controller is interfaced with the GSM Module. This setup is fitted in home. The energy meter is attached to the micro controller. This controller reads the data from the meter output and transfers that data to GSM Module through the serial port. The embedded micro controller has the knowledge of sending message to the system through the GSM module. Another system is placed in EB office, which is the authority office. When they send "unit request" to the microcontroller which is placed in home. Then the unit value is sent to the EB office PC through GSM module. According to the readings, the authority officer will send the information about the bill to the customer. If the customer doesn't pay bill on-time, the power supply to the corresponding home power unit is cut, by sending the command through to the microcontroller. Once the payment of bill is done the power supply is given to the customer. Power management concept is introduced, in which during the restriction mode only limited amount of power supply can be used by the customer.

C. *System Implementation*

Fig.2. Mobile Adaptive Test User View

The system is implemented based on the Android Emulators with a version of 4.0. The server is designed and developed based on PHP and MYSQL. To attract the user/learner a rich multimedia content is an interface in the MAT. Due to the icons and menus, a learner can easily take any test due to its attractive features which are depicted in Fig 2. Once the user login to the application, it automatically syncs the Home page to the learners. The configuration file for MAT is Androidmanifest.xml. The learner's performance is checked efficiently in the MAT. MAT not only creates enthusiasm among the learners but also the tutors. The tutors can also modify the exam content based on the learner's knowledge. Thus the learner can learn a lot and develop their careers.

The overall design of the proposed model in user content access is depicted in Fig 1. The learners use mobile phones for accessing their online courses. The Learners provide a request to the LMS through an internet connection. The Content Management system is a software where the admin can create, manage and modify the content in the application without any specialized technical knowledge. The learner can directly interact with the application and share their knowledge and doubt with the co-learners thereby it supports collaborative learning. Based on the learner's device the learning content also adapted. The data are shared from the Learning Management System (LMS) to the learners. The corresponding response is provided to the learners. The device can visualize the different modules which in-built in the M-Learning Application.

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IV. Results And Discussion

We conducted a survey about mLMS among 75 volunteers. The integration of mLMS with extra application adaptability and its performance is discussed. [4] For our research purpose, we took a review from the students in different universities. We conducted an online review for mLMS application where 500 volunteers provide their feedbacks about the M-Learning Application. The learner's Dashboard consists of Courses, Lessons, Flash Cards and Quiz. The courses constitute of course details. For example the courses such as C program, Java program, PHP program, and ASP.net program.

Fig.3. Dashboard and Courses

After that, the user can see the lessons for each course. The user can learn each lesson which is depicted in Fig.4. Flashcards are used to learn the content very fast. The Flashcards provides efficient learning to learners through some tests. Through this analysis, the learner can review their knowledge and skills.

Fig.4. Lessons and Flashcards

The learners can view their proficiency level through this activity. After completion of the Beginner level then they can move to the Medium then Advance level. Thereby they can enhance their knowledge in an efficient way which is depicted in Fig.5.

Fig.5. Beginner Level

From the Quiz menu, the learner can play the knowledge-based game. After the game played the score details are displayed based on their scores and remarks.

Fig.6. Quiz and Score Details

All the data are updated in LMS. Admin can view and modified the learning content if necessary. [6] Discussed about Positioning of a Vehicle in a Combined Indoor-Outdoor Scenario, The development in technology has given us all sophistications but equal amounts of threats too. This has brought us an urge to bring a complete security system that monitors an object continuously. Consider a situation where a cargo vehicle carrying valuable material is moving in an area using GPS (an outdoor sensor) we can monitor it but the actual problem arises when its movement involves both indoor (within the industry) and outdoor because GPS has its limitations in indoor environment. Hence it is essential to have an additional sensor that would enable us a

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ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

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Vol. 7, Issue 6, June 2020

continuous monitoring /tracking without cutoff of the signal. In this paper we bring out a solution by combining Ultra wide band (UWB) with GPS sensory information which eliminates the limitations of conventional tracking methods in mixed scenario(indoor and outdoor) The same method finds application in mobile robots, monitoring a person on grounds of security, etc. Thereby collecting all the data from the user, it is easy for ranking the application among other applications is depicted in Fig.6.

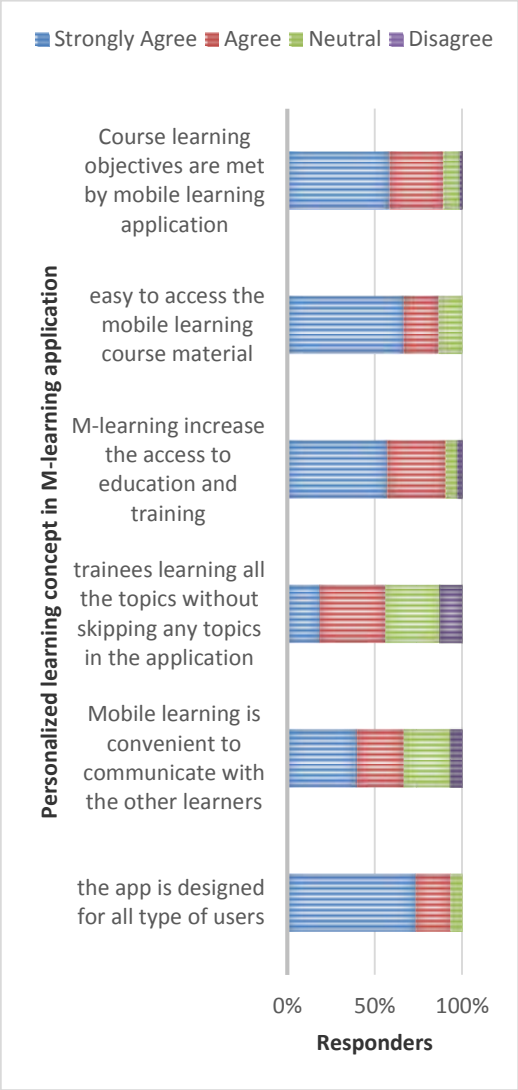

Fig.7. Personalized learning concept in M-learning application

The adaptability of the M-Learning for personal learning is evaluated and ask a question about the M-Learning to the learners and illustrated in Fig.7.

The volunteers said that they are so interested to use M-Learning Application for education which is depicted in Fig.8. They are totally satisfied with the mLMS Application.

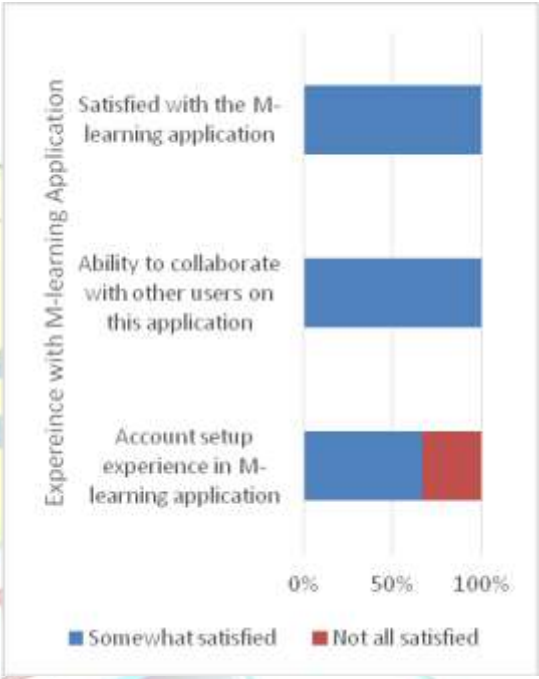

Fig.8. Experience with M-learning Application

V. CONCLUSION

In our proposed model, we conducted numerous surveys and evaluations where most of the volunteers provides positive feedback for M-Learning Application. The learners are so enthusiastic while learning in mLMS. The mLMS is implemented in the Android Platform. The learner can learn any context from anywhere and at any time without constraints. As per the need of the learners they can download or view the learning content in different formats such as text, image, audio, and video. The LMS update and provide numerous information to the learners in an efficient way, it acts as the back-end server for the system. The LMS is a collection of stateless web services so it can interlink with any website and provide the information to the client. Three prototype applications developed and discussed their usability. The MAT can enhance the learner's knowledge by providing various assessments for them. Through Mobile or Tablet, they can access and answer for the assessments test

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ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 7, Issue 6, June 2020

from anywhere at any time. The learning content is designed and structured based on the pedagogical and technical principles.

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