Learning Enhancement in Tertiary Institutions Using Mobile Technologies

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Abstract

The educational standard in tertiary institutions has witnessed a down turn in the area of teaching and learning. This paper links this down fall to traditional face-to-face educational model that is still by far the dominant mode of education and learning in tertiary institutions. In addition to identifying some of the ways in which traditional learning has hampered learning, the paper proposes the enhancement of learning through the use of mobile technologies. This paper presents M-learning architecture and further examines how mobile technologies could be utilized by lecturers and students to enhance student's learning experience. The paper also showcased the graphic user interface of a developed mobile learning system.

Keywords: educational standard, tertiary institutions, M-learning architecture, mobile technologies.

1.0 Introduction

The proliferation of mobile technologies such as mobile phones and personal digital assistant, and their pedagogical capabilities calls for their educational use to enhance learning in tertiary institutions. As mobile phone becomes popular in the society and many people can afford the cost, the demand of mobility is extended to teaching and learning [1]. Never in the history of the use of technology in education has there been a technology that was available to citizens as mobile telephone. The statistics are stunning: Eriksson and Nokia tell us that there are 1,500,000,000 of them in the world today for a world population just over 6 billion [2]. Nokia forecasts further sales of 700,000,000 in 2005. Despite the popularity and affordability of mobile technology, the classic face-to-face education is still the most widely accepted mode of teaching and learning in higher institution. The characteristics of face-to-face education or traditional education are that the education transaction takes place within the learning group, by interpersonal communication and between the teacher and the taught [2]. This form of learning has in one way or the other caused decline in educational standards in our tertiary institutions. As Mark Prensky has suggested, toady's students are no longer the people the current educational system have been designed to teach. Today's students have enormous access to digital technology and display characteristics such as digital fluency and familiarity with new technologies as never before imagined, they are digital natives [3]. It is, therefore necessary to incorporate their digital literacy within meaningful learning scenarios. In line with these developments, we propose the enhancement of learning experience through the use of mobile technologies. Mobile learning is learning delivered or supported solely or mainly by handheld or mobile technologies [4]. Mobile learning is primarily delivered over

the wireless network. It can adapt quickly to meet changing learning needs. It is possible for learners to find and learn what they want to at a pace and place that suit them. The blending of mobile technologies and traditional education will enrich the final outcome of learning task.

2.0 Traditional Learning And Falling Educational Standards

The adoption of traditional learning as the only mode of teaching and learning amongst other factors has contributed to the falling educational standard in tertiary institutions. Traditional learning is also known as conventional learning, or face-to-face learning or instructor-led-training (ILT). It takes place in schools, training centres, laboratories and workshops. Knowledge transfer, education and learning have traditionally been delivered through the classic face-to-face space-and time-restricted educational model that has been the backbone of tertiary institutions [5]. Teaching and learning happens in the classroom only and it is instructor-centered for all knowledge. This mode of teaching and learning is characterized by some environmental and infrastructural challenges.

The challenges and issues facing traditional learning amongst others include:

- lack of space or classrooms within the tertiary institution
- inability of some students to take notes during lecture
- lack of preparedness on the side of both the instructor and learners
- lack of courage on the side of students to ask questions during lecture
- poor teaching techniques adopted by some instructors or educators.

These listed challenges have negative impact on learning and understanding among students of tertiary institutions, and directly or indirectly retard the standard of education. Investigation into student's retention and progression showed that poor retention was variously attributed to lack of preparedness, poor integration, wrong course choice, lack of feedback, problems with finance and accommodation amongst others [6].

3.0 Mobile learning based Enhancement

Mobile learning also known as M-learning is the acquisition of any knowledge and skill through the use of mobile technology, anywhere, anytime, that results in an alteration in behaviour [7]. Mobile learning could also be seen as any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies [8]. In other words mobile learning decreases limitation of learning location with the mobility of general portable devices. Mobile learning is gaining popularity as a way of providing learners with educational material wherever they are and at any time. With new capabilities continually being added to mobile devices, one major challenge, and opportunity, is finding innovative ways to enhance the learning experience using these new technologies [9]. It presents as an approach to learning that potentially is effective in engaging and motivating today's students.

Mobile technologies offer learning experiences which can effectively engage and educate contemporary learners and which are often markedly different form those afforded by conventional methods. Mobile learning, however, is not restricted to the distance learners and is not restricted by location; it can be used on campus as well as off-campus and provides convenient, ubiquitous and easy access. Since mobile learning makes learning materials available to learners via their mobile technologies, they (learners) will have the opportunity to go through these

materials over and over again in the comfort-of their rooms. This will enable learners to integrate these learning episodes across time, to support their growth and transformation of knowledge. Learners will no longer be confined within classrooms. They will be learning while working, hiking in the mountains, playing, strolling on the beach, or jogging along a city street. These new paradigms can benefit tertiary institution by helping them to achieve better educational results and enhance the learning outcome of students [5]. In summary, benefits derived when traditional learning approach is supported with mobile technologies include the followings amongst others:

- making learning materials available anytime and anywhere - learning is not confined to pre-specified times or places, but happens whenever there is a break in the flow of routine daily performance and a person reflects on the current situation, resolves to address a problem, or to gain an understanding [10]
- can enhance interaction between and among students and instructors [11]
- support differentiation of student learning needs and personalized learning [12]
- reduce the effect of those problems that come as a result of environmental and infrastructural challenges
- pre-work for class session
- follow-up for class session (reinforcement of key point)
- feedback from the system provides reinforcement.

The use of mobile devices to gather feedback from learners during a session being delivered by a teacher employs a hybrid model that emphasizes the integration of mobile devices into existing teaching practice, not the replacement of it [13].

Although mobile learning has a lot of benefits, it also has some limitations such as limited display and memory capacity of m-learning devices or technologies.

3.1 Developing mobile learning application

Mobile learning could be engineered through the development of dedicated applications. A mobile learning system consists of at least the following components:

- mobile learning devices;
- mobile learning software;
- mobile learning content [14].

Figure 1 below depicts the components involved in mobile learning system.

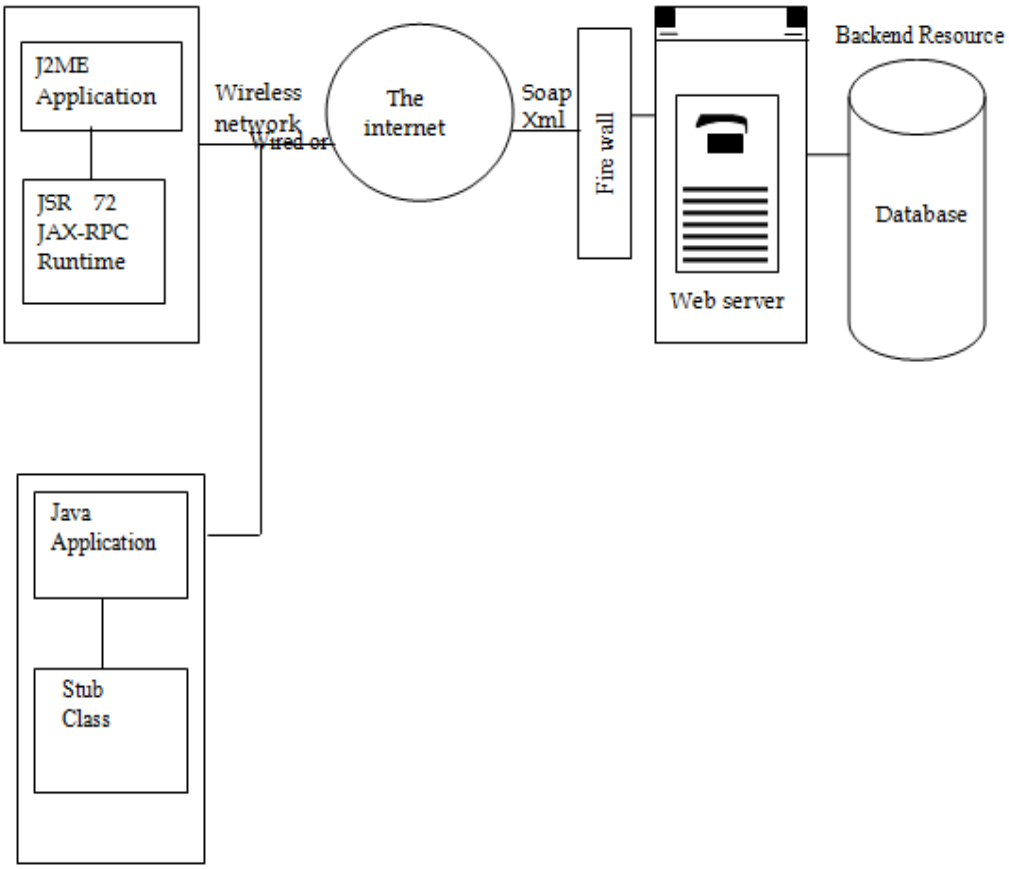

Fig 1. M-learning Architecture

The applications required for mobile learning process in the prototype developed are grouped into two:

- Java application
- J2ME application

The Java application is installed in a computer that is connected to the Internet with or without wire. This provides the interface where the lecturer can perform functions such as adding course contents, updating and editing course contents; sending feedback; adding questions etc. This application communicates with the server through web service with the help of the stub. The stub calls web service methods.

The J2ME application also known as MIDLET is an application that runs in a mobile device or technology. The mobile device has a wireless connection to the internet and its application communicates to the server through web service, with the help of JSR 72 JAX-RPC runtime.

The above architecture is web based, therefore, Internet technologies are required to connect users. The message transmitted to the server is in Soap XML format.

The server houses the web service that provides several web methods which are consumed by these mobile learning applications.

The web service used by this application has been developed using Java

technologies. The firewall provides the required network security.

Content of the mobile learning applications is stored in a database (backend resources). The system developed here uses the Postgres Relational Database Management System (PRDBMS). Examples of database content include the course content, students' information, courses etc.

Flowcharts

Figures 2 and 3 below are flowcharts of the developed applications.

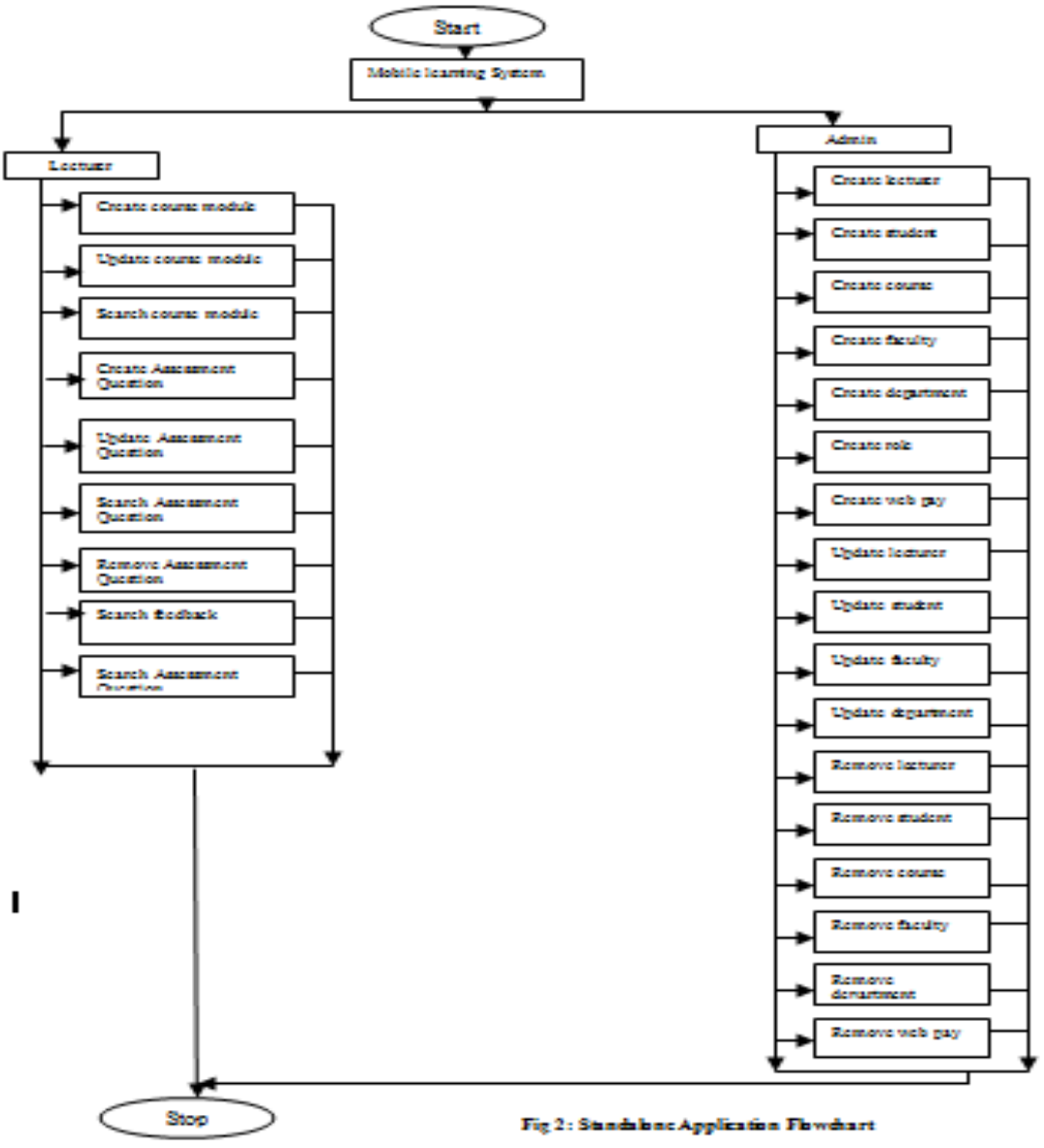

Fig 2 : Standalone Application Flowchart

Graphic User Interface

The Integrated Development Environment (IDE) used to develop the prototype is NetBeans. The interface is simple and intuitive which will reduce the amount of memory required by the application and also reduces the time of development.

Use Cases:

- **Lecturer interface**

This interface shows where the lecturer can perform the following functions:

- Lecture making
- Adding question
- Adding answers to the Questions
- Sending feedback e.t.c.

Figures 4 through 6 are the illustrations of the graphical interfaces associated with the lecturer.

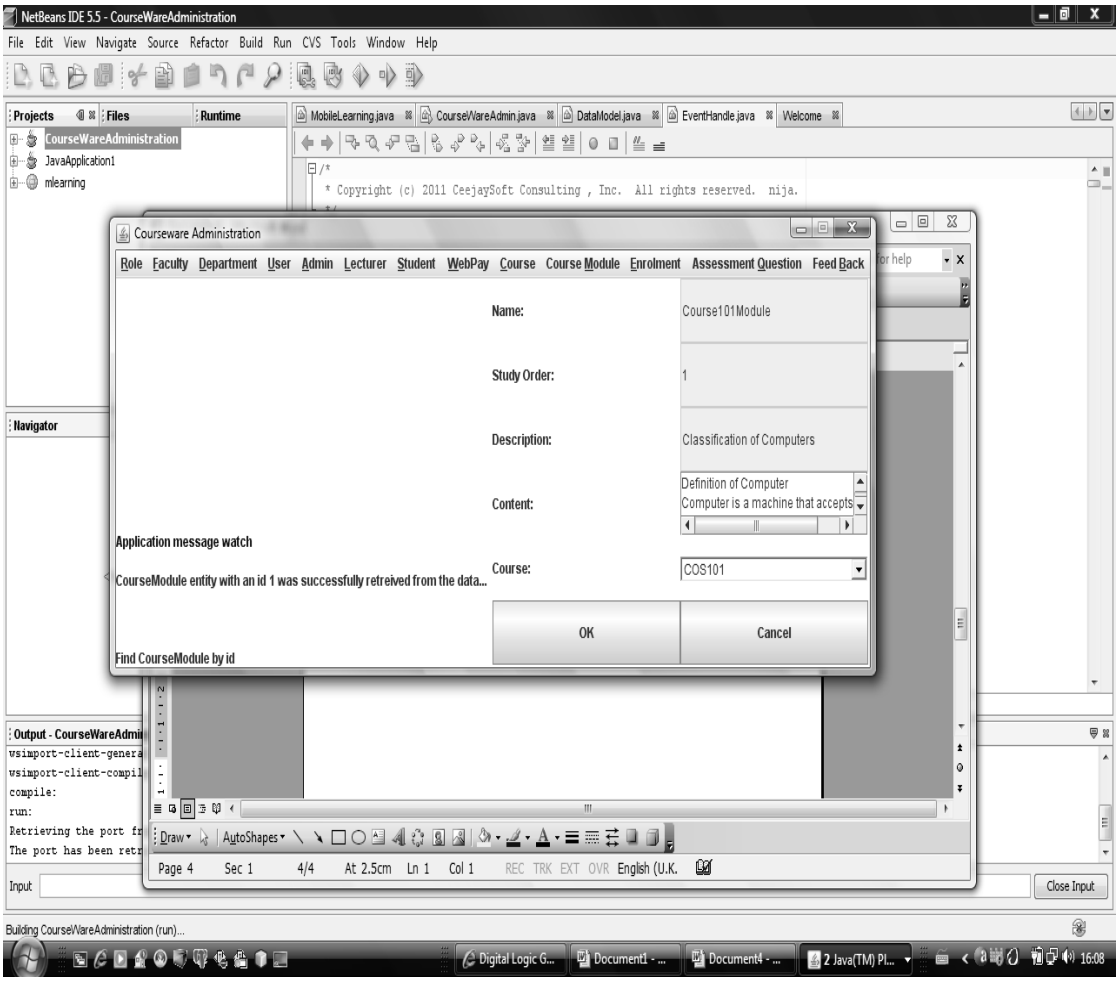

Fig 4. Main menu of the java

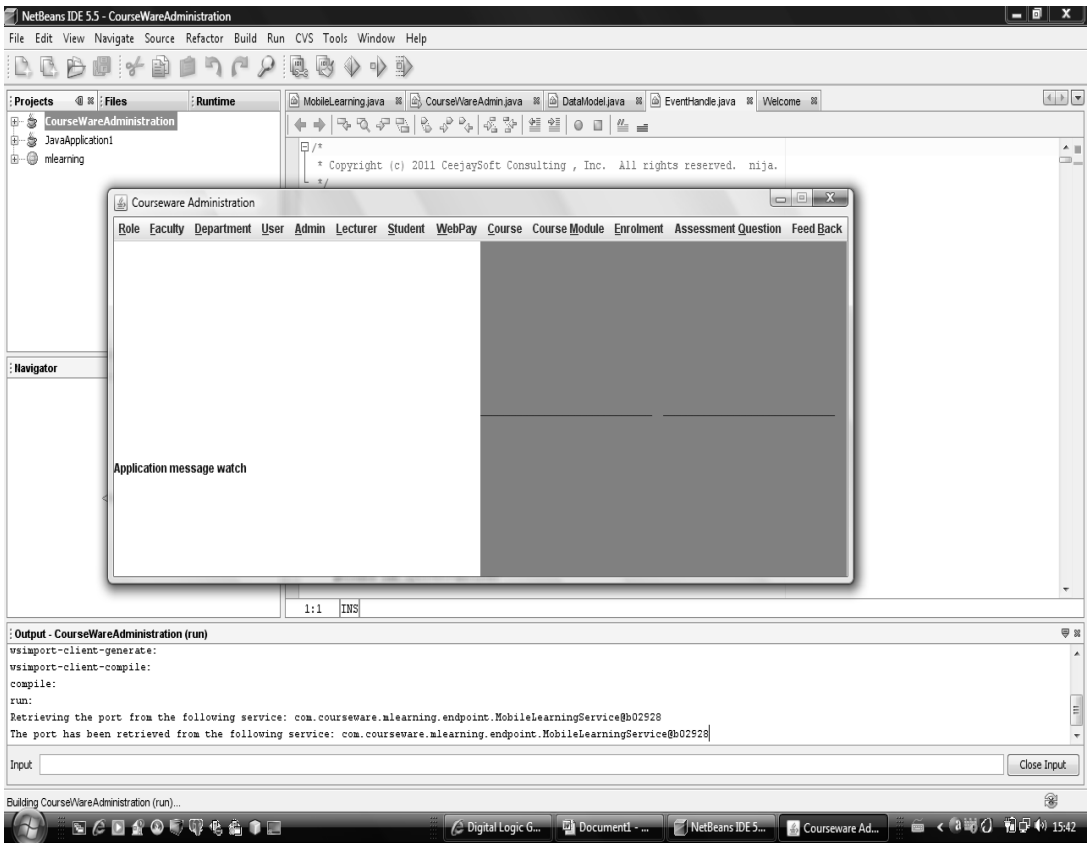

Fig 5. Lecture Making Interface

Application

Fig 4 is the main menu of the java application. Each menu has a number of menu items that represents those actions that can be performed.

Fig 5 is the interface that is associated with lecture making or course module creation. The required information include name of course module, the module study order, module description, module content and the course that has the module. This interface is associated with assessment questions creation. Information here include the questions, answer options, and correct option, question point and the module that has those questions.

- **Student's interface**

The interfaces for students enable them to download lecture notes for reading, answering assessment questions, sending feedback etc

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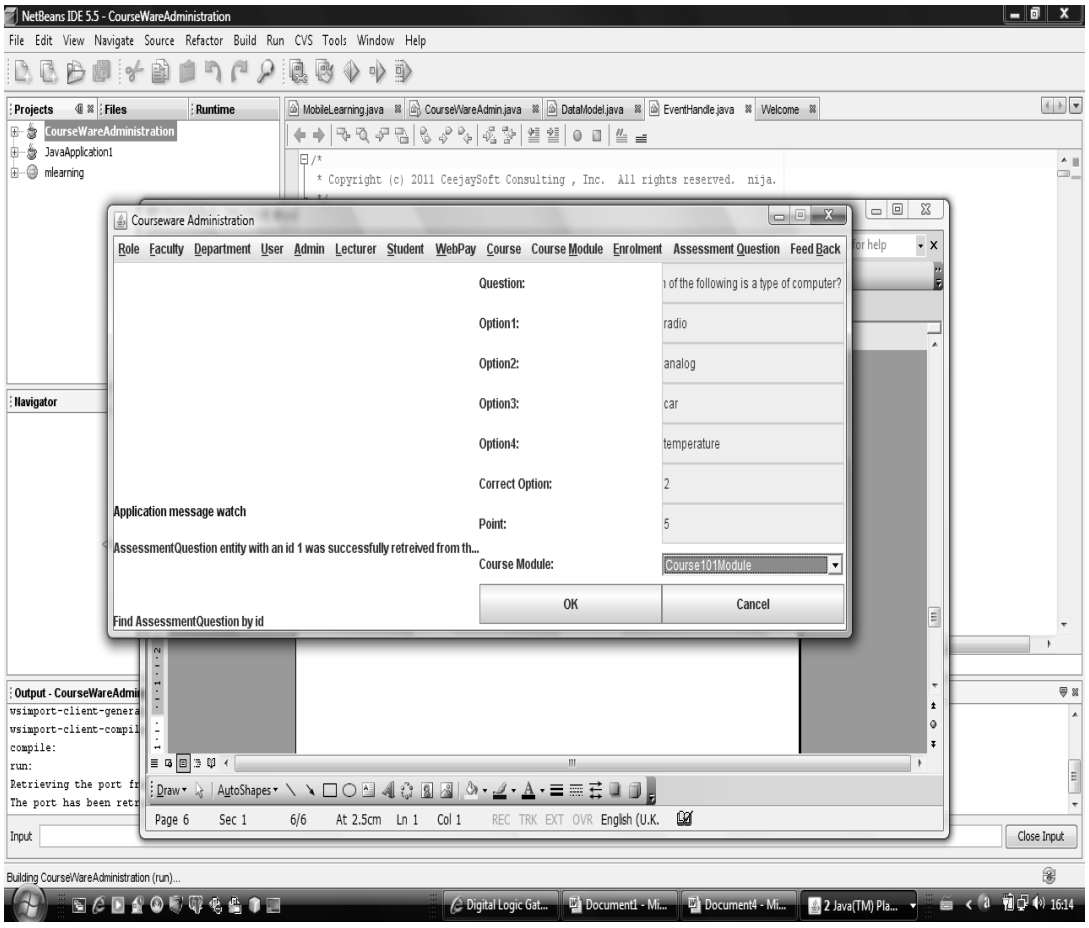

Fig. 6: Student Interface Menu

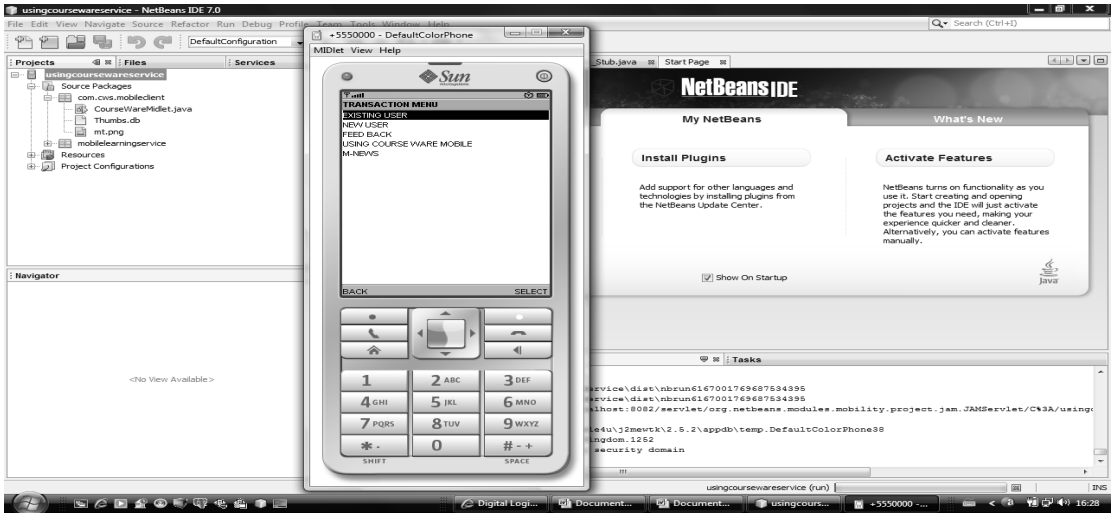

Fig 7. Transaction menu

Fig. 7 demonstrates those transactions that students perform on the mobile portal.

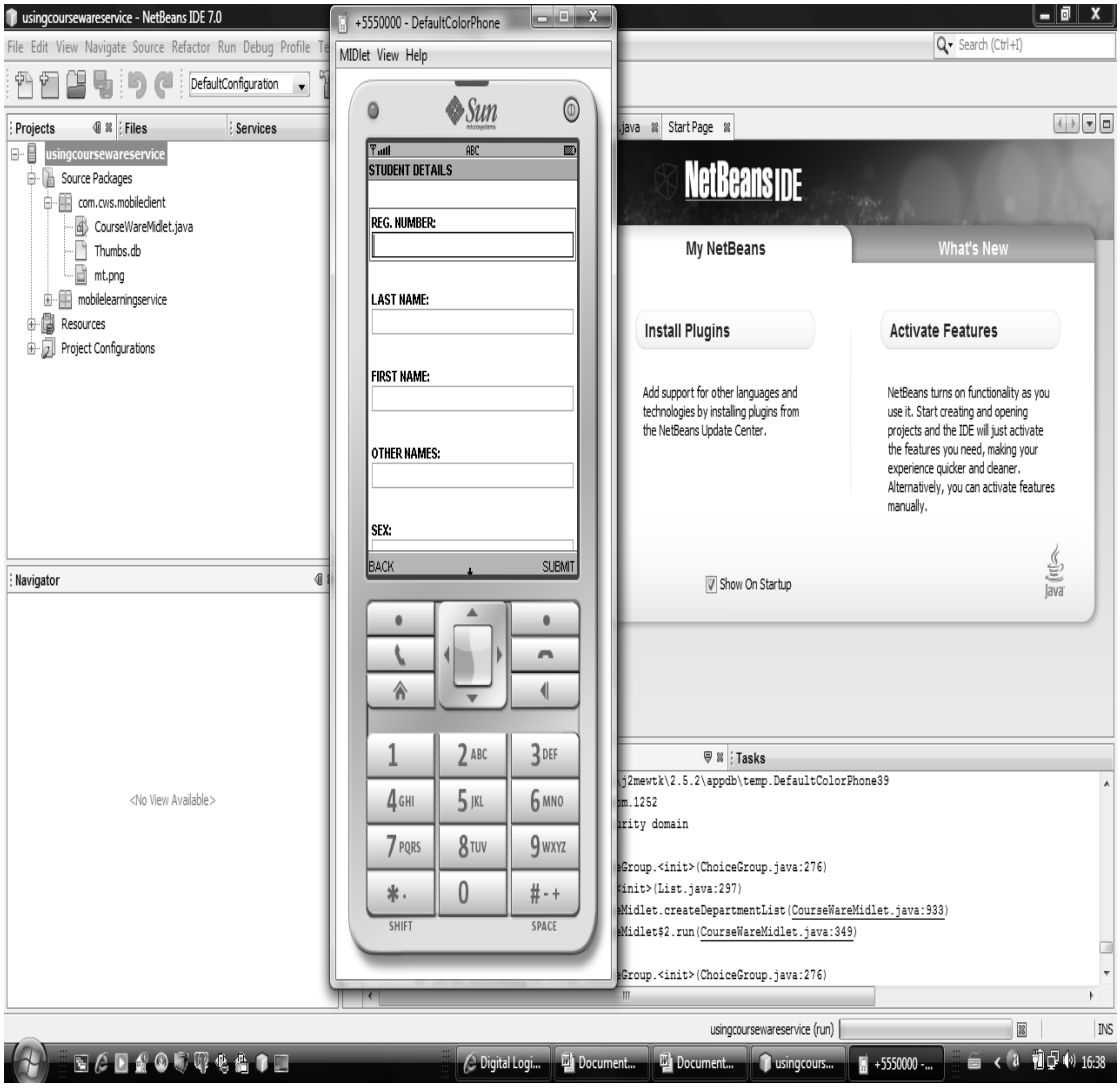

Fig 8. New student's registration form

Here, new students register for mobile learning by supplying and submitting the required information.

Fig 9. User authentication

Here, the user is authenticated before he or she can assess the lecture note.

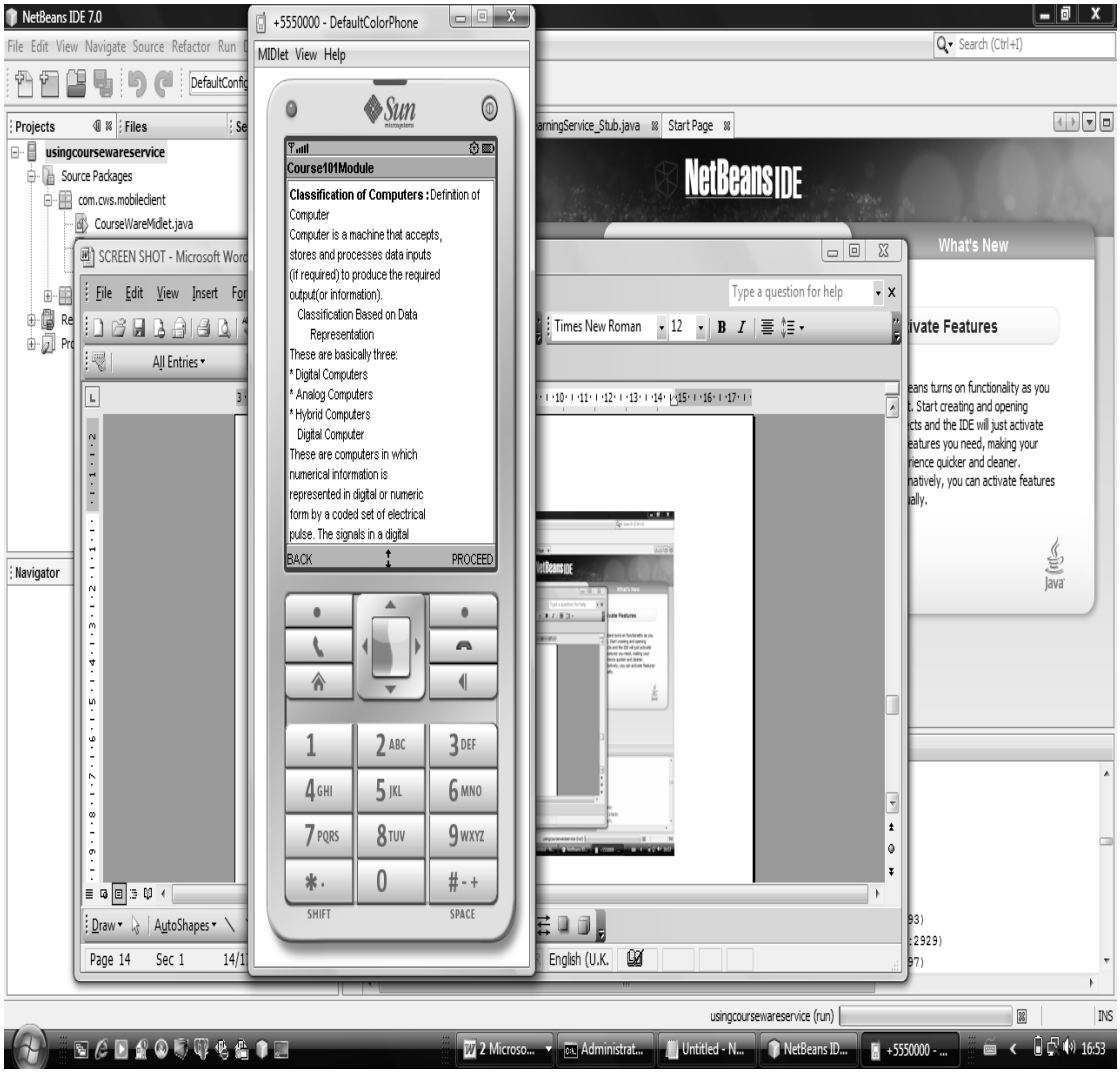

Fig 10: Downloaded course module

The interface here shows course material delivered on student's mobile device.

4.0 **Conclusion**

In this paper we have demonstrated that applications (Java, and J2ME) can be developed that would enable instructors design learning material for delivery on mobile technology and also allow learners access the learning material via their mobile phones. These applications consume Java web service. The incorporation of this form of learning system into traditional learning approach will enhance teaching and learning more meaningfully.

References

[1] Chi-Hung L. and Yuen-Yan C. Mobile Learning: A new Paradigm in Electronic Learning. Retrieved March 18, 2011, from Http://www.te.ugm.ac.id/~widyawan/mobilearn/mobilearnparadigm.pdf.

[2] keegan, D., "The Incorporation of Mobile Learning into Mainstream Education and Training", Retrieved March 18, 2011, from http://www.mlear.org.za/CD/Papers/Keegan1.Pdf.

[3] Ducan-Howell J. and Lee K. (2007). M-Learning: Finding a Place for Mobile Technologies within Tertiary Educational Setting. Retrieved March 18, 2011, from http://www.ascilite.org.au/conferences/singapore07/procs/duncan-howell.pdf.

[4] Mohamed, Ally (2009). Mobile learning: Transforming the delivery of education and training.Retrieved March 18, 2011, from http://www.aupress.ca/index.php/;books/120155.

[5] Akour, H. (2009). Determinant of Mobile Learning Acceptance: An Empirical Investigation in High Education. Retrieved April 02, 2011, from http://mobile-libraries.blogspot.com/2009/07/determinants-of-mobile-learning.html.

[6] York, M. and Longden, B.(2004).Retention and Student Success in Higher Education, Open University Press, Michigan.

[7] Nash, S.S. (2007).Mobile learning, Cognitive Architecture and the study of literature. Rretrieved April 02, 2011, from http://proceedings.Informing science.org/INSITE 2007/11STV4P811-818Nash 399.pdf.

[8] Wikipedia, The free encylopedia. Retrieved April 02, 2011, from http://en.wikepedia.org/wiki/m learning.

[9] Parson, David, and Newnham, Joshua (2006).A Web Service Architecture for Rich Content Mobile Learning Clients.Retrieved March 18, 2011, from http://citeseerx.ist/psu.edu/viewdoc/summary?doi=101.1.96.7190.

[10] Sharples, Mike et al (2002).The Design and Implementation of a Mobile Learning Resource. Retrieved March 18, 2011 http://citeseerx.ist.psu-edu/viewdoc/download?doi=10.1.1.98-5373&rep=rep1&type=

[11] Corbeil, J. R., and Valdes, M.E., "Are you ready for mobile. Retrieved March 18, 2011, From http://www.educause.edu/EDUCUSE+Quarterly/EDUCAUSE QuarterlyMagazineVolum/AreYouReadyforMobileLearning /157455.

[12] Kukulska-Hulme A.(2005). Current Uses of Wireless and Mobile Learning. Retrieved March 18, 2011, from Http://www.jiscac.uk/uploaddocuments/current%20uses%20FINAL%202005.doc.

[13] Naismith, L. et al (2004). Literature review in mobile technologies and learning. Retrieved April 02, 2011, from http://www.futurelab.org.uk/resources/documents/lit- reviews/mobile.review.pdf

[14]. Pocatilu, Paul (2010). Developing Mobile Learning Application for Android using Web Services. Retrieved April 02, 2011, from http://www.fags.org/periodical /201007/216255141.html