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A Self-Regulated E-Learning System Using Adaptive Hypermedia Architecture

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ABSTRACT

Electronic learning has changed the conventional pattern of studying in the universities for some decades back, especially in developing countries. Its innovative nature of instructional delivery tends to provide blended learning with the inculcation of multimedia in teaching pedagogy. The existence of virtual education in many e-learning systems had undermined students' responsibility at tertiary level to plan, control and reflect the learning process. In this paper, an e-learning system was developed with guidance and adaptation support. The functional scope of the developed system is 'learner-led' which allows lecturers and students whom are geographically dispersed to leverage on time and space in higher education. Learning experiences are being delivered through web pages hosted on web server and accessible to students synchronously through internet enabled device with web browser for self-paced study.

Keywords: Adaptive Hypermedia, E-Learning System, Self-regulation,Web Platform.

1.   INTRODUCTION

The growth of electronic learning has been incremental as a result of globalisation and the yearning for knowledge based economy, but its effective use and pedagogical sustenance is still lacking especially in developing countries. E-learning refers to electronic learning; as the modern educational approach and the application of instructional technologies to teaching and learning process. [9]defined e-learning as the utilization of Information and Communication Technology (ICT) to help and upgrade learning and instructing in advanced education foundations. [1]web based learning alludes to learning and other strong assets that incorporate computer-based instruction, online training, computer-based guidance, and innovation based guidance. Web based

adapting surely gives an assortment of ways to deal with improve methods of sharing knowledge.

The web is a suitable channel of interacting with sources of information across the internet but the channel is faced with the challenge of little guidance to assist the user to locate relevant and interesting information in the highly explosive

data storage environment [2] There are more undergraduates enrolled in an online class than there are graduate students enrolled in all MSc and PhD programs combined" [4]. As the pace of global change has increased, so has our need for learning considering the tremendous changes in both the amount and variety of information resources, as well as great change in technology that has affected our lives from education to communication [5]

According to [5] higher education has an important role to play through its graduates who provide leadership roles in education as researchers, teachers, consultants and managers that will create and apply new knowledge and innovations on development problems and service to the people. Several studies have indicated that higher education institutions need to integrate the concept of sustainable development together with their curriculum and societal need [8]. [1]asserts that all forms of educational technology that technologically supports learning and teaching are embodied in e-Learning. Consequently, there is no consensus about prerequisite structure for adaptation and flexibility of e-learning courses. Incorporating students' characteristics into e-learning framework in order to address individual differences in learning environment where learners and instructor, facilitator or content provider are geographically dispersed had only been given little attention.

2.   LITERATURE REVIEW

Learning is simply the relative change in human behaviour due to experience, thus positive or constructive change can

be observed in learners through attitude and aptitude, expressed in terms of skill, knowledge, idea, norm and morality. [2]reported how policy makers and school owners were urged to work towards making teaching and learning more technologically oriented; "using technology strategically would ensure greater academic success and prepare the recipients for more leadership roles in the twenty-first (21st) century. The quality of knowledge and skills possessed by undergraduate students is also determined by the kind of method used in teaching and availability of logistics for training [3]). There are evidences of integrating the concept in curriculum but awareness about instructional technology requires all concerns taken the task as major responsibility in order to achieve the long term future of quality service provided in higher educational institutions.[8][5] says due to the intermingling of ICT, thus various data assets, understudies are confronted with data blast and require certain uncommon aptitudes; the abilities of data proficiency to search out data and to comprehend, assess and apply what they find. The technological skills required of learners in twenty-first (21st) century goes beyond digital literacy but more of social constructivism learning process and to be very relevant in the workforce [2]. The success or failure of an educational goal depends largely on the cooperation or otherwise of all stakeholders [3]. Design perspectives of e-learning system evolves space, time and infrastructural concerns in learning environment, therefore, it is suitable for distance learning approach and effective alternative to conventional classroom-based learning.

[7]reported that the idea of e-learning at ObafemiAwolowo University came in response to insatiable appetite of youths for learning, to get them their desired course with convenience through the use of a customized tablet. Application of learners' metacognitive skills should be encouraged in e-learning environments by prompting learners to plan, attend to relevant content, and monitor or evaluate their leaning [9]. CMS offers tools that allow students to interact synchronously and asynchronously with one and another in e-learning. The structural design of CMS provides instructional support for both experienced and inexperienced students in learning online to improve their self-regulation skills [9]Among the learning technologies, web-based learning offers several benefits over conventional classroom-based learning [1]. The learning material is easy to keep updated and the teacher may also incorporate multimedia to provide a friendly content and to ease the understanding of the concepts [3], as corroborated by adaptive hypermedia architecture below.
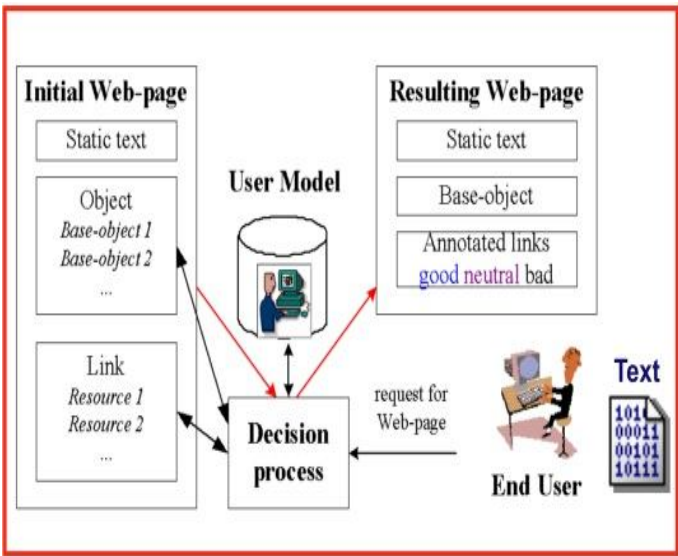

Figure. 1: adopted…Adaptive Hypermedia Architecture [6]

3.   SYSTEM DESIGN AND IMPLEMENTATION

The developed system consists of the following modules: - course module, content adaptation, electronic book download, lecturer's support for learners who are the students of host institution at front end. These modules work hand in hand in the realization of the overall objectives of the e-learning system. The control and administration segment principally involves the operations and processes that focus on the administration and management by the system administrator who is the technical manager or ICT consultant of host institution at back end. The system is designed in a way that every user has an account; for access control with username and password to login.

The system administrator can register users, create account for learners, add account profile for facilitator, add learning contents, view existing users, modify the contents, upload more topics, and publish the progress reports. This system does not advocate totally against the conventional system of knowledge acquisition, but to project a combine approach which is 'blended learning' so as to manage the limited space and infrastructure in our universities.

A formal model of the proposed system was built using Unified Modeling Language (UML). The UML is a modeling tool which provides a set of conventions used to describe a software system with objects and diagrams that provide different perspective or functional views of the system.

Figure 2 shows the activity diagram of the self-regulated electronic learning system.
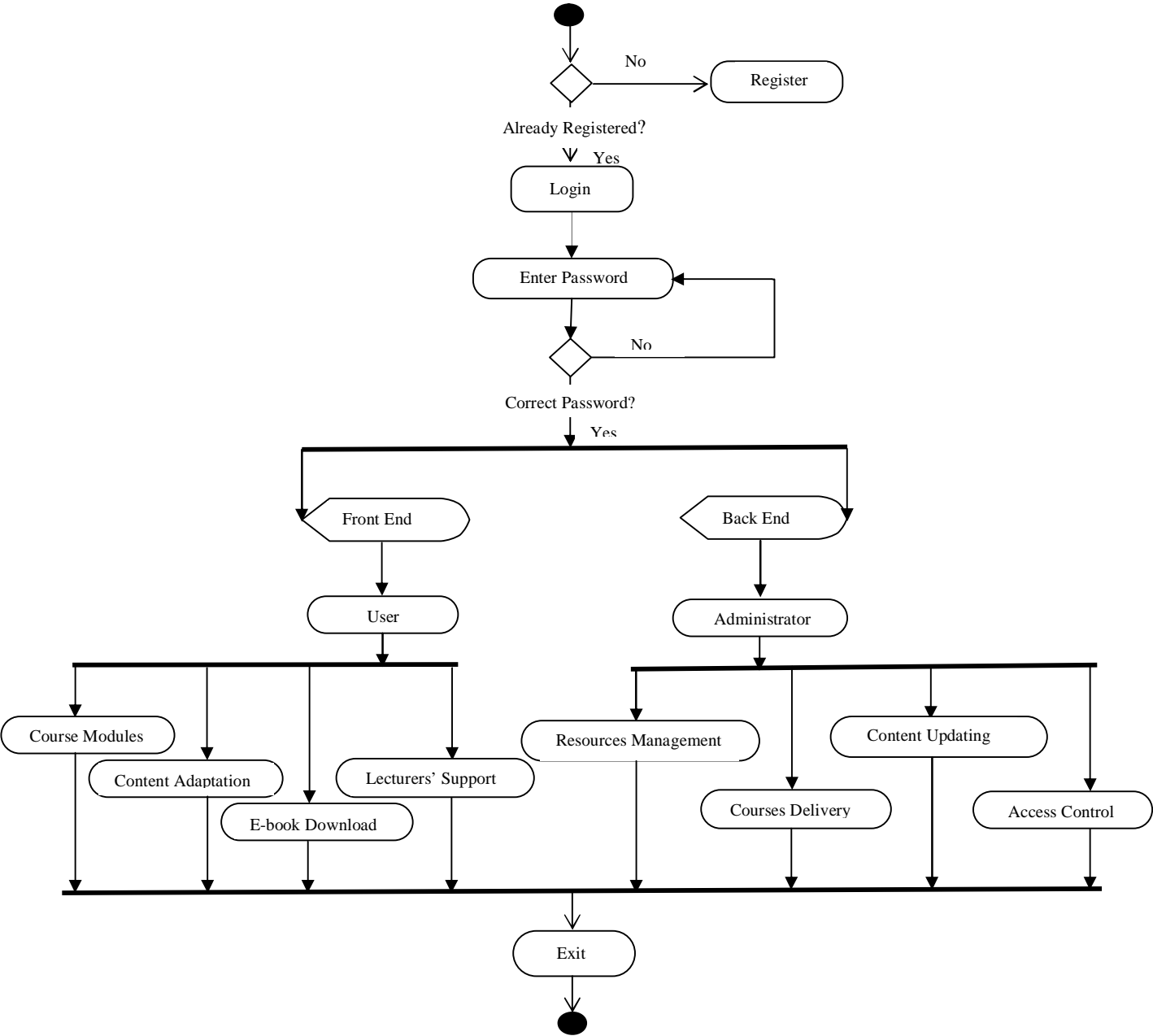
Figure 2: Activity Diagram Of The Self-Regulated Electronic Learning System.

The implemented self-regulated e-learning system contains several screen shots, out of which the following five figures could be reported. Figure 3 Registration, Figure 4 Content Dashboard, Figure 5 Course Panel, Figure 6 Download Dialog, and Figure 7 Text Adaptation.
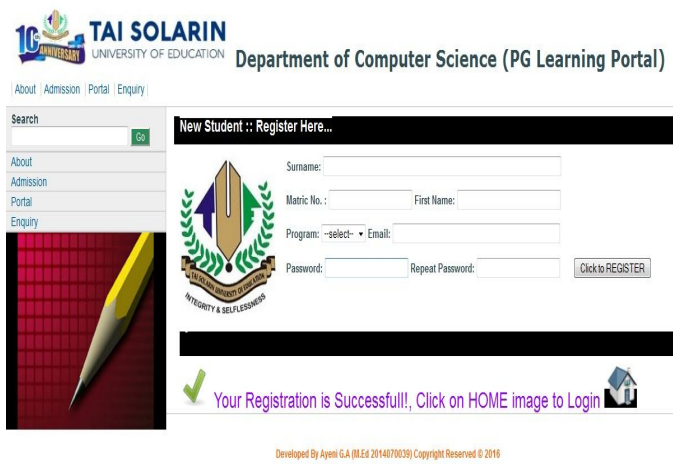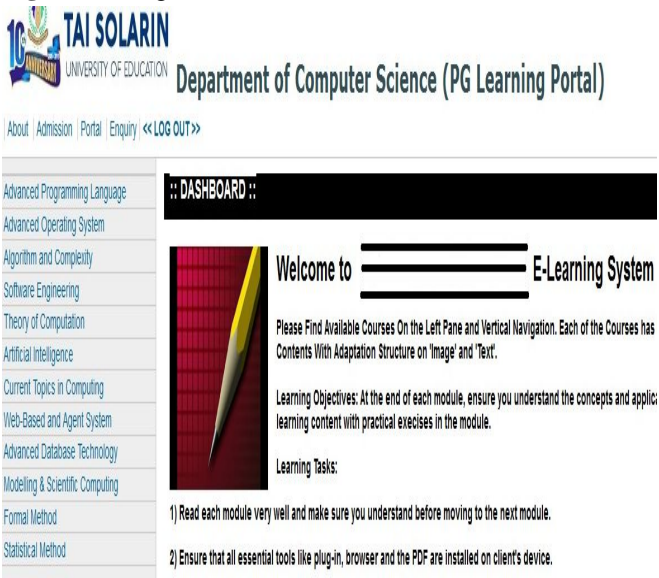

Figure 3: Registration
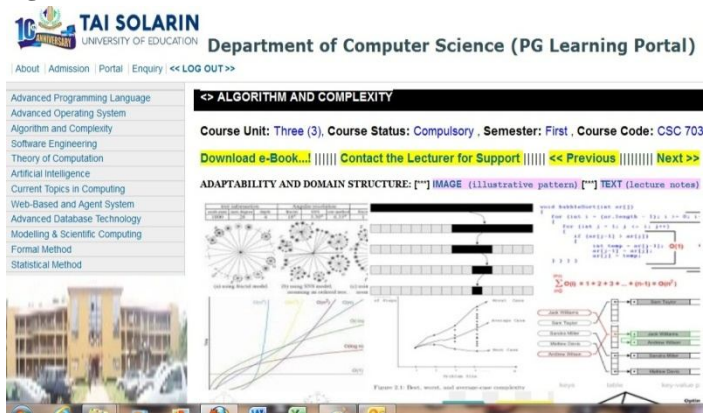

Figure 4: Content Dashboard
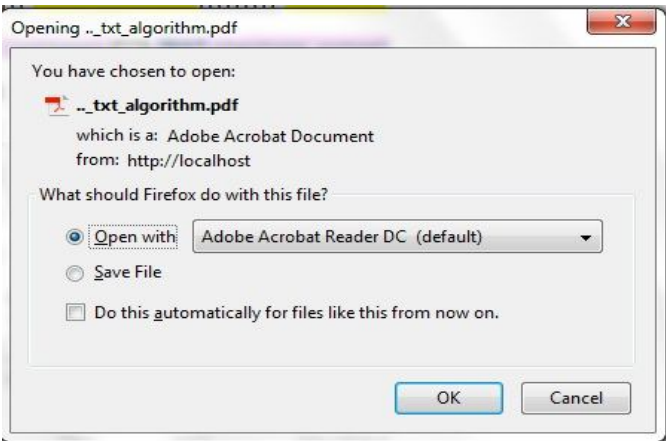

Figure 5: Course Panel
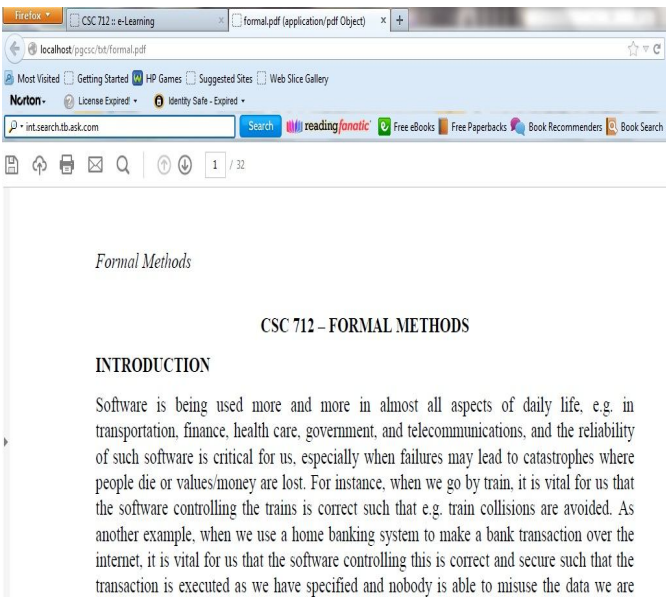

Figure 6: Download Dialog

Figure 7: Text Adaptation

The new system was implemented using web programming languages and authoring tools embedded in Macromedia Dreamweaver; XHTML for web interface as front-end, PHP for server-side scripting as middleware and MySQL for database management as back-end. This is because these programming languages have the advantages of easy development, flexibility, platform-independence and ability to provide code hints with structure-based workspace to the developer and programmers. The choice of programming languages for system development was also determined by the availability of validation handler and code inspector in the development environment. Its translator also supports modular programming and generality, especially the PHP scripts that facilitate data transmission between client and

server; since a decade back the number of web servers using PHP has grown exponentially to billion across the universe which makes it suitable for system implementation and deployment.

4.   RESULTS ANDDISCUSSION

This new system has been carefully tested and the result has tallied with the expected output; ensuring quality of service in terms of accessibility, usability and acceptability due to relatively reduced cost. It is also self-paced, learner-centred and distributed because it scaled adequately in time and mobility leveraging on wireless infrastructure so that an e-learner or registered student do not need to necessarily own a computer, because he/she can also gain access to and use the system through a mobile device with internet connection.

The generality of adaptive e-learning system was also considered during evaluation; its functional mechanism is flexible enough to accommodate other domains of knowledge. Therefore, the developed system caters for student characteristics that may influence the learning process and subject expandable.

5.   CONCLUSION AND FURTHER RESEARCH

Nowadays, every student has become partial e-learner through the necessity of ICT literacy and competence to surf the web from repository of information and online databases in research, assignment submission, accessing e-books and cooperative learning via tutorials blogs and social media. Educators can quickly assemble, package and distribute web-based instructional content as well as facilitating learning in their courses online.

In electronic learning, many web-based courses exist but they are typically oriented for conventional on-campus students whom are more prepared and motivated with prior knowledge. The role of teacher, instructor and lecturer in building e-learning courses is more of content development and facilitation with the use of multimedia workstations.

Multiple dimensions of students' characteristics will be considered as part of the future works, so as to extend adaptation structure to multimedia artefacts like video and audio elements with unlimited conditions of adaptation, because only few characteristics of students (i.e e-learners) were considered in this research.

The focus was basically on text and image components of e-learning content as limited conditions of adaptation and navigation structure. Enhancing the system for virtual and collaborative learning environment is also a research

direction, so that students can support one another's learning through blog and chat module.

As part of future works, the developed electronic learning system can also be modified for deployment on the mobile platform. This will increase the accessibility of the system as mobile phone use is wide spread in Nigeria today and to bridge the gap in space, time and infrastructure.

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