

Conceptual Model For Developing E-Learning Systems Based On User Learning Patterns And Styles.

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ABSTRACT

Over the past decade universities all over the world have realized the value of providing educational information and services electronically. This paper develops a unique conceptual model by integrating a set of new factors identified in the literature, which are: user experience and service quality. The adopted algorithm models a process of content delivery that first determines the students' level of understanding of the domain before presenting him with a course material. The model presupposes that the course under study is broken down into modules (MOD) – which are smaller manageable portions dwelling on only one key concept. This system delivers learning contents to students based on their learning preference. This would enhance assimilation and understanding of what is taught, hence the improvement of the quality of products from our educational institutions/establishments.

KEYWORDS: E-Learning, Model, Learning patterns, Learning styles, User learning patterns.

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I. INTRODUCTION

It is evident today that the introduction and use of ICTs in education helps to promote and enable educational reform. ICT is seen as a useful tool to both motivate learning and promote greater efficiencies in education systems and practices [1]. Since the invention of computer and information technology in the late 19th century, every establishment, industry and indeed processes had been striving to adapt to this new technology and migrate from the erstwhile analogue procedure and processes to better, faster and more convenient digital and computerized methods. Although the educational industry is not left out in this migration, the involvement of IT in this industry is yet very minimal, especially in Africa and other developing countries. Though we have witnessed some groundbreaking inventions and interventions of IT as regards learning and education in these past decades, it is still a known fact that there is a fast decline in educational standards and in the quality of products of educational establishments. E-learning has become progressively more vital for academia and corporate professional training. The worldwide growth of this technology is due to the increased competition amongst higher educational institutions to attract learners and meet their educational aims and needs [2] [3].

Earlier research, notably that of [4] and some recent modifications of it has also shown that the rate and pace at which each individual responds to learning depends on the particular method(s) used in delivering the learning materials and that this differs from person to person depending on their personality. Therefore, to be able to tap the full potentials of IT in the education industry, there's need for a reengineering of that industry; moving away from the traditional solo method of face-to-face classroom style of deliveries to more diversified modern and computerized ways, bearing in mind that there are individual preferences and capabilities as regards understanding and assimilation of what is being taught/learned.

In the light of these, three areas of concern had been identified as militating against the process of learning/education and thus the quality of graduates from educational institutions.

These include but are not limited to:

- 1) Traditional face-to-face classroom style of delivering learning materials is the predominant method adopted in most developing countries (Nigeria inclusive). Due to diversities in individual preferences and assimilation capabilities towards each delivery method this style sometimes comes short of imparting effectively to the students.

- 2) The system in use in our establishments does not encourage students to learn at their own style and pace, and as such they may not take the most advantage of and tap the full potentials of the system and the learnt courses.
- 3) Information and communication technology has not been fully exploited and brought to bear on our educational system especially in Africa and other developing nations causing the students that go through these systems to lose out on its many advantages.

This paper therefore proposes a model for developing e-learning systems bearing in mind the different learning patterns and styles. This system delivers learning contents to students based on their learning preference. This would enhance assimilation and understanding of what is taught, hence the improvement of the quality of products from our educational institutions/establishments.

II. TRENDS IN EDUCATION AND LEARNING

The 21st century has been called the information age because of the explosion of availability of knowledge in the century catalyzed by the advent of information technology and the internet within the last decades of the last century. This new technology permeated and transformed every aspect of the human endeavor launching us into a fast track of innovation and development, such as had not been witnessed in the past decades and centuries. Its sphere of influence cuts across virtually every discipline and known establishment, from science to politics to commerce, radically transforming the way people interact and perform their everyday jobs. In order to keep up with this change in our society brought about by information technology, educational establishments and educators are being forced to shift from their traditional face-to-face classroom style of delivering knowledge in order to adapt to this ever changing trend. Here are some popular trends in education: Robert Hawkins a specialist in ICT and education identified 10 global trends of education viz: [5]

- a. Mobile Learning: The employment of mobile devices as the appliance of choice in the classrooms over the personal computers and other appliances.
- b. Cloud computing: Applications are increasingly moving off of the stand alone desk top computer and increasingly onto server farms accessible through the Internet. The implication of this trend for education systems is that they will make cheaper information appliances available which do not require the processing power or size of the PC.
- c. One-to-One computing: The increasing move around the world to provide an information appliance (PC, tablet, net computer etc) to every learner in the classrooms.
- d. Ubiquitous learning: School systems around the world are developing the ability to provide learning opportunities to students “anytime, anywhere”.
- e. Gaming: A recent survey by the Pew Internet and American Life Project per the Horizon Report [6] found that massively multiplayer and other online game experience is extremely common among young people and that games offer an opportunity for increased social interaction and civic engagement among the youth. The phenomenal success of games with a focus on active participation, built in incentives and interaction suggests that current educational methods are not falling short and that educational games could more effectively attract the interest and attention of learners.
- f. Personalized learning: This exploits the use of technology to better understand a student’s knowledge base from prior learning and to tailor teaching to both address learning gaps as well as learning styles.
- g. Redefinition of learning spaces: Schools around the world are re-thinking the most appropriate learning environments to foster collaborative, cross-disciplinary, students centered learning. Concepts such as greater use of light, colors, circular tables, individual spaces for students and teachers, and smaller open learning spaces for project-based learning are increasingly emphasized.
- h. Teacher-generated open content: Teachers and networks of teachers are increasingly being empowered to both identify and create the learning resources that they find most effective in the classroom. Many online texts allow teachers to edit, add to, or otherwise customize material for their own purposes, so that their students receive a tailored copy that exactly suits the style and pace of the course. These resources in many cases complement the official textbook and may, in the years to come, supplant the textbook as the primary learning source for students.
- i. Smart portfolio assessment: The collection, management, sorting, and retrieving of data related to learning will help teachers to better understand learning gaps and customize content and pedagogical approaches. Also, assessment is increasingly moving toward frequent formative assessments which lend itself to real-time data and less on high-pressure exams as the mark of excellence.
- j. Teacher managers/mentors: The role of the teacher in the classroom is being transformed from that of the font of knowledge to an instructional manager helping to guide students through individualized learning

pathways, identifying relevant learning resources, creating collaborative learning opportunities, and providing insight and support both during formal class time and outside of the designated instruction period.

A number of universal themes come up again and again in discussions across the wide world of education. Even though the emphasis might vary across different regions and countries, yet the same issues arise continually. This includes:

- Collaborative learning
- The criticality of direct engagement (with teachers, students, families, the community)
- Leadership and vision
- Partnership across the public and private sectors
- equity
- Re-empowerment of the teaching force
- The need to shift the focus of control to the individual learner.

These summarize the direction education and educational institutions are going to ensure that this all important aspect of the human existence is not left behind in this fast-paced generation and age.

III. E-LEARNING PLATFORM

An E - Learning platform is a software-controlled learning infrastructure that tries to replicate the activities that one sees in the traditional face-to-face classroom. They are normally located on a server on the Internet (or an Intranet) and are typically accessed by means of a Web browser. It refers to a range of tools and services often described using terms such as educational extranet, Virtual Learning Environment (VLE), Learning Management System (LMS), Intelligent Learning Management System (ILMS) and Learning Content Management System (LCMS), providing learning and content management. A typical learning platform commonly integrates:

- Content management – creation, storage, access to and use of learning resources
 - Curriculum mapping and planning – lesson planning, assessment and personalization of the learning experience
 - Learner engagement and administration – managed access to learner information and resources and tracking of progress and achievement
 - Communication and collaboration - emails, notices, chat, wikis, blogs
- Learning platforms offers considerable advantages when adopted by educational institutions over and above the traditional classroom environment. Some of these advantages include, but are not limited to:
- It economizes time for the teacher/instructor especially when coaching students with disparity in assimilation capabilities.
 - Creates an environment for the students, who increasingly spend time on the computer and internet, to learn as well as interact with each other, and with the teacher anywhere, anytime.
 - Ensure that quality control requirements are met by providing a standard vehicle for collecting the required information.
 - It makes it possible to integrate learning at both on and off the campus or at different campuses.
 - Since most learning platforms support Shareable Content Object Reference Model (SCORM) as a standard way to upload, launch and track courses, it makes it easy to transfer courses from one platform to another, and to reuse course material. Also a single course material may be used for several other related courses simultaneously thus saving time, energy and resources.
 - Most learning platforms integrate online communication forums and social media which could be a quick way for sourcing help, opinions and ideas.
 - Some Platforms also integrate educational games providing students a fun way to learn while relaxing.

IV. E – LEARNING TOOLS

Several tools are available to provide eLearning and one of them is Moodle [7]. In Moodle, teacher or lecturer is free to create courses related to his/her own teaching and syllabus. Under course, lecturer is free to create one or more topics to explain a specific syllabus. In topic(s), the lecturer may design specific activity, such as conducting quiz, providing specific teaching material, measuring student's achievement, etc. Other eLearning tools also include Courseware, Google Classroom, EDpuzzle, Socrative, etc. [8].

Courseware is a term that combines the words 'course' with 'software'. It can be defined simply as software used for instruction. Normally, courseware is differentiated from other programs such as word processors and spreadsheets that are usually called “applications.” Applications are office tools and are independent of the content that one creates through the use of the application. Courseware on the other hand is not independent of content. For example, courseware for the study of Engineering contains Engineering

materials and may be designed to allow interaction with some engineering models. Computer programs used to create courseware are called authoring programs. E-learning authoring tools enable trainers to integrate an array of media to create professional, engaging, interactive training content, and some make it possible to repurpose digitized elements or learning objects from an existing course for reuse in a new one.

Courseware authoring therefore could be regarded as the creation of these applications which enable teachers/trainers or authors package an environment (usually computer-based) for the impartation of knowledge to the learners, synonymous to a virtual classroom but with much extended capabilities than the conventional classrooms.

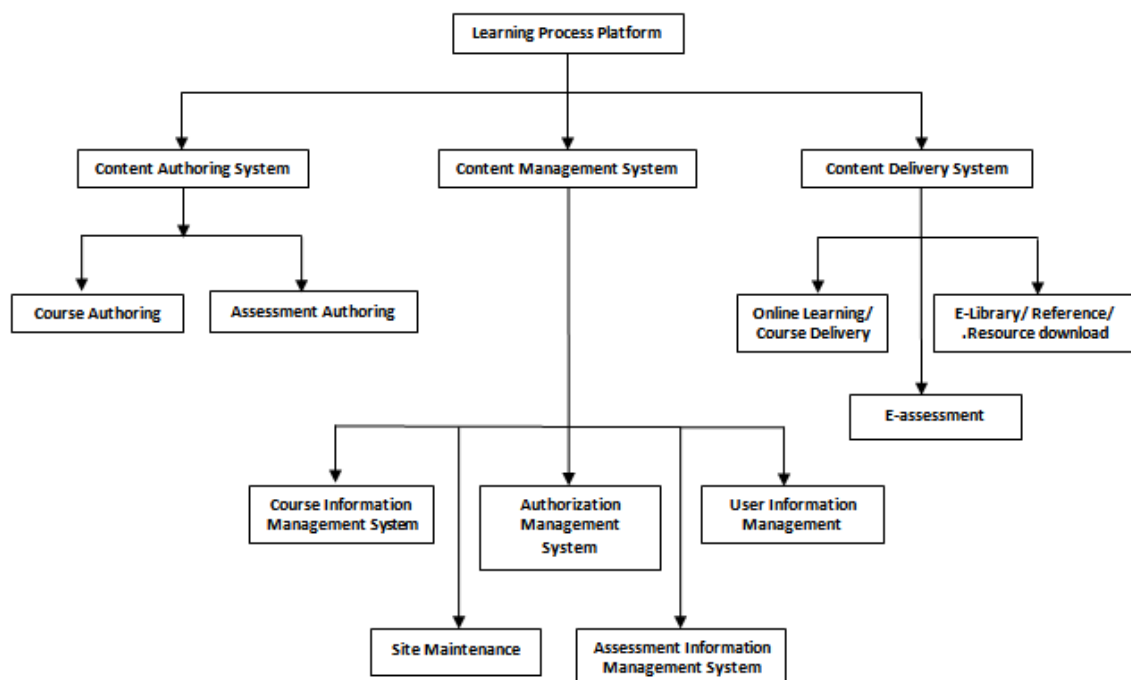
There are many reasons for using courseware to supplement traditional teaching methods as posited by researchers at Kenyon college [9].

Courseware can visually present concepts which are not easily rendered on paper or in text.

- Courseware is portable; learners can access it in computer laboratories and on their own machines.
- Courseware is available when the instructor cannot be, so it extends the classroom experience.
- Courseware can be designed not only to present materials but to interact with the learner, and provide the opportunity for feedback (which, depending on the program, can be recorded and evaluated).

V. E-LEARNING MODEL

Based on the technical requirements and industry standards, the block diagram of a typical learning process platform is show in figure 1. Here, the learning platform is viewed as comprising of three major parts: the content authoring system which allows for the creation of both the courses/course modules and the assessment/assessment modules; the content delivery system which is the subsystem that delivers/displays the already created contents; and the content management system which is where the coordination and management of the whole system takes place. The content management system also consist of user (both facilitators/teachers' and students') authorization and management, presenting to each user only the interface relevant to his/her task.

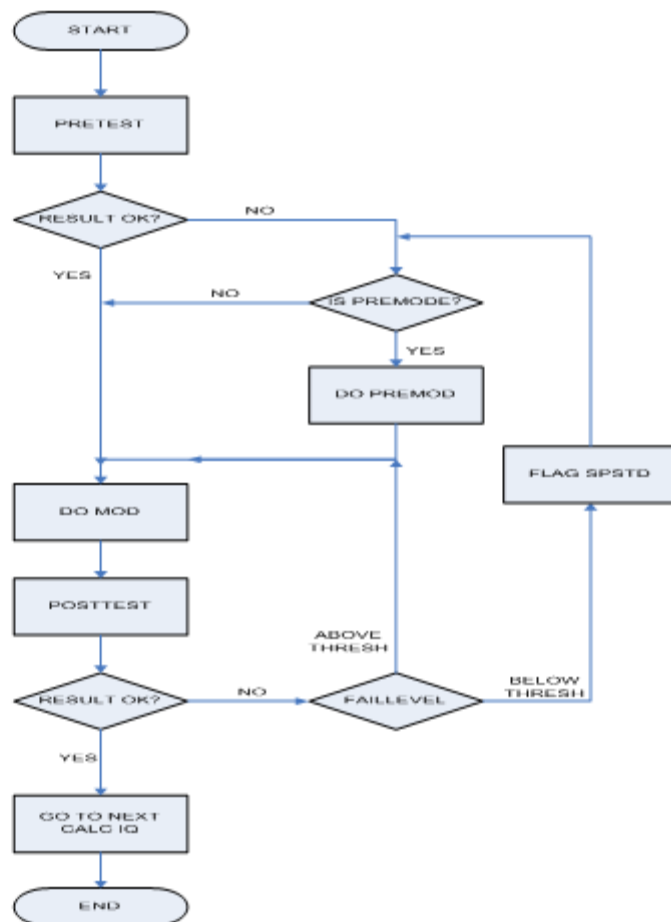


It is imperative to deliver just the right learning material to a student in the right format as a wrong content or the wrong format could discourage a student or affect his psychological approach to the course material and hence impair his assimilation of the course. An algorithm for modelling a universal learning process control is shown in figure 2. The algorithm models a process of content delivery that first determines the students' level of understanding of the domain before presenting him with a course material. Here, the model presupposes that the course under study is broken down into modules (MOD) – which are smaller manageable portions dwelling on only one key concept. It also presupposes that each module may have prerequisites (PREMOD), which are key concepts whose understanding are necessary requirements for an appreciation of the module under study. The courseware service agent will then proceed to serve this PREMOD depending on the

student's performance in a PRETEST performed at the beginning of the course to determine the student's level of understanding of the module.

At the end of each module an assessment (POSTTEST) is also conducted to ascertain the students understanding of the module just taught. Based on performance in this assessment, the software flags the student as needing special attention, serves him a repeat of the module or takes him to the next module and calculates his Intelligence Quotient (IQ).

With this setup, a course administrator or lecturer will understand the IQ of each student, not just based on a final graded examination – which have been found to be quite deceptive at times – but on per key concept or topic level. Even without a final examination, the lecturer already knows the performance index of each student and will then be able to determine how to support each student – especially the less intelligent or mentally challenged ones. Thus the emphasis on education will shift from performance on final graded exam and certificate acquisition to impartation of knowledge and proper understanding of key issues and concepts.



VI. CONCLUSION

E-Learning has become an application needed to enhance business. One application of eLearning is to use with Knowledge Management Systems. The algorithm developed in this work models a process of content delivery that first determines the students' level of understanding of the domain before presenting him with a course material. This paper proposed a four layers architecture, master data, course, topic, and activity. This four layers architecture, in return provides several benefits like reusability, flexibility, and efficient process. In flexibility aspect, this proposed model of eLearning is expected to provide benefits like more effective output to deliver course material and faster time to deploy the course. Flexibility is delivered on course layer, topic layer, and activity layer. In reusability aspect, this proposed model of eLearning is also expected to provide benefits like more effective output to deliver course material and faster time to deploy the course. Reusability is delivered on course layer and topic layer.

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