

Architectural and Parametric Design Evaluation for Enhancing Adaptive E-Learning



Daramola Comfort Y., Akinpelu Samson. A, Joshua Bature Hassan

Abstract: Learning is any technique that in living creatures prompts never-ending limit change and which isn't solely a direct result of characteristic advancement of developing. The complexity associated with learning and the fact that it start from birth till death makes it a cumbersome procedure. It incorporates certainly more than reasoning: the whole character - resources, feelings, impulse, values and will. Many conventional approaches fail to inculcate the above parameters which increase the cumbersomeness of learning coupled with problems of assimilation. If we don't have the will to learn, we won't learn and if we have learned, we are truly changed by one way or another. The focus of this paper is to propose an architecture that was designed with special emphasis on enhancing adaptive e-learning. This architecture uses the learning style of learner to produce learning contents peculiar to such learner and as such difficulties associated with comprehension is totally aborted and thereby making learning easier.

Keywords: Learning, Adaptive, E-Learning, Learning-Style, Knowledge.

I. INTRODUCTION

More than two decades, e-learning has been recognized as one of the most effective means by which knowledge is transmitted to students in the world today, because of numerous advantages it offers. It creates an enabling environment for learning everywhere everyplace and anytime. Mostly it is usually a web-based system of educating learners which afford them the opportunity to access online contents available on the net at their conveniences. It incorporates self-motivation, communication, efficiency, and technology which are paramount as far as learning is concern in 21st century. But one major reason for failure is that only placing course notes on the web without taking learners style into consideration does not indicates whether knowledge has been acquired or not.[1]. In the recent, research has shown that e-learning is helpful to education by reducing poor performance of students in higher institution of learning, not only that, various organization and all forms of learning groups are not left out as well. It is cost effective, not time consuming, and yields considerable amount of results, but adaptive e-learning do much more.

Adaptive e-learning can be defined as learning using electronic means for the acquisition of knowledge and skill such as online courseware through local and wide area networks that takes into account the learning style of the learner[2]. As such, adaptive e-learning is predominantly a network-oriented transfer of skills and knowledge to the learners by recognizing learner's best mode of knowledge acquisition and comprehension and switches to the best mode by which such learner can gain knowledge. The learner best style of assimilation is discover after evaluation through systematic design and switching to that style becomes easy [3]. Though, swapping from one learning style to the other is self-determine by the system, but it definitely follow some criteria as a result of assessment in order to guarantee stability of knowledge acquisition. Since 1990, adaptive e-learning has gain much consideration and on-going research statistical report is indicating a significant growth in the next decade, as the most efficient system in giving the learners the needed support on their learning path and maximizing their performance especially in some field that are difficult to comprehend [4].

Out of several learning style that exist in [5], Felder-Silverman learning style model is most suitable because learners are categorized into four group which are: the active-reflective, visual-verbal, sensing-intuition and sequential-global. The categorization of learner in this model captures all possible modes of gaining knowledge as indicated in figure 1.1.

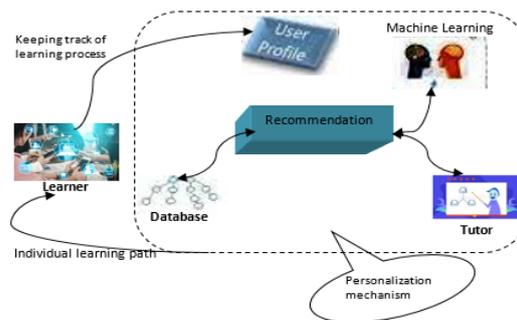


Figure 1.1: Adaptive e-learning architecture

Although learning at any stage is said to be neurobiological and complex procedure. The most well-known belief about learning incorporate is that, it is a consistent increment in information, putting away data that can be utilized in obtaining certainties and strategies that can be held and utilized relying upon when important, deciphering and understanding issues with alternate points of view and ways. [6].

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There are various parameters that assume significant jobs in this procedure; case of such is observation and activity of information by people, their general abilities, their improvement highlights and ecological components. Since learning process is influenced by many variables, it would mean various things to different people. Consequences of a few investigations show that mulling over these distinctions while structuring learning and encouraging condition builds the adequacy and productivity of learning exercises [7, 8].

An ideal adaptive e-learning through a conceptual framework, considered as an option to the conventional "one size fits all" approach was proposed in [9]. In a way, the work has supported the improvement of educating and learning towards a powerful procedure for knowledge by adopting an intelligent tutoring systems (ITS), micro-adaptive approach and comprises of components masterminded into expertise module, the student-modeling module, the tutoring module and a student interface module which makes up the ITS's design. The system did not incorporate learners' level of assimilation and understanding, evaluation which are indispensable to adaptive e-learning system. The complexity associated with learning in its entirety necessitated a holistic means of assessing learner's level of comprehension, which will invariably suggest the need to switch in learning mode when necessary.

A detail review of online e-learning and cognitive disabilities with emphasis on the need to address the particular peculiarities of people with intellectual weaknesses or incapacities was presented in [10]. E-learning is depended upon to be basic apparatuses for enhancing access to training and at last helping social incorporation incorporating persons with disabilities (PWD). It gives a review of the ebb and flow condition of research on e-learning openness for people with psychological inabilities, but not to the level adapting to learners' mode which is the major focus of this paper. The combination of text, image, visual, audio and video display incorporated into the current study eliminate the limitation of biological weakness and capture all categories of learner.

An adaptive security architectural mode for protecting identity federation in service oriented computing, utilizing open key framework that sticks to the Service Oriented Architecture (SOA) security principles and determinations was put forward in [11]. It attempts to address some security vulnerabilities and assaults that the undertaking students are experiencing with the federated identity systems.

The primary objective of this paper is to design and develop an adaptive e-learning system using video, audio, read/write (VAR) learning style and a parametric design evaluation for fast acquisition of knowledge by learners.

This paper is divided into four (4) major sections. The introduction is where issues, objectives, and detail overview are discussed in section one; research method is explained in section two; and results and analysis are discussed in section three ; design evaluation and development of adaptive e-learning system using VAR is discussed in sub-section 3.1; and conclusions and recommendation for further research opportunities are discussed under section four (4).

II. MATERIALS AND METHODS

The proposed system used a design evaluation through a decision algorithm(DA) to determine which learning mode a learner will be subjected to in order to increase level of assimilation. This is archived through a web based programming language (Netbeans 8.1 and PHP) used for the interface and a web server (XAMP). The reason being that as a learning platform level of interactivity with the system by users will be high and so complexity must be eradicated considering the fact that learners have different backgrounds. A back-end software (Mysql server) was used to keep track or record of all learning activities such as users' login and registration details, learning style inventory, learning contents, level of adaptation, etc.

Learner who want to register into this e-learning platform, after signing up, login into the system. It then shows a pool of subjects to select from, after clicking on the subject, a list of topics pops out then for each topic, it is divided into sections. For each section, after a student takes a section in a particular learning style, a comprehensive evaluation of knowledge acquisition in is taken to check if the learner understands that section. If the result indicate failure that section is retaken in another learning style to ensure that the learner understands the topic and the process of assessment is repeated until a satisfactory result is obtained. Once the first section has been completed, it proceeds to the next section, in this section, the learning content will be adapted to the learning style that was used in the previous section in which the learner has highest level of assimilation. This continues, and then the system is able to get the statistics of the most used learning style for the learner which will in turn form the learning style for the learner.

III. RESULTS AND DISCUSSIONS

3.1 Software Requirements

The implementation detail of the proposed system is contained in this section; it describes the entirety of program support that fosters high performance without comprising users' need and expectations within the context of e-learning.

3.2 System Sub Modules

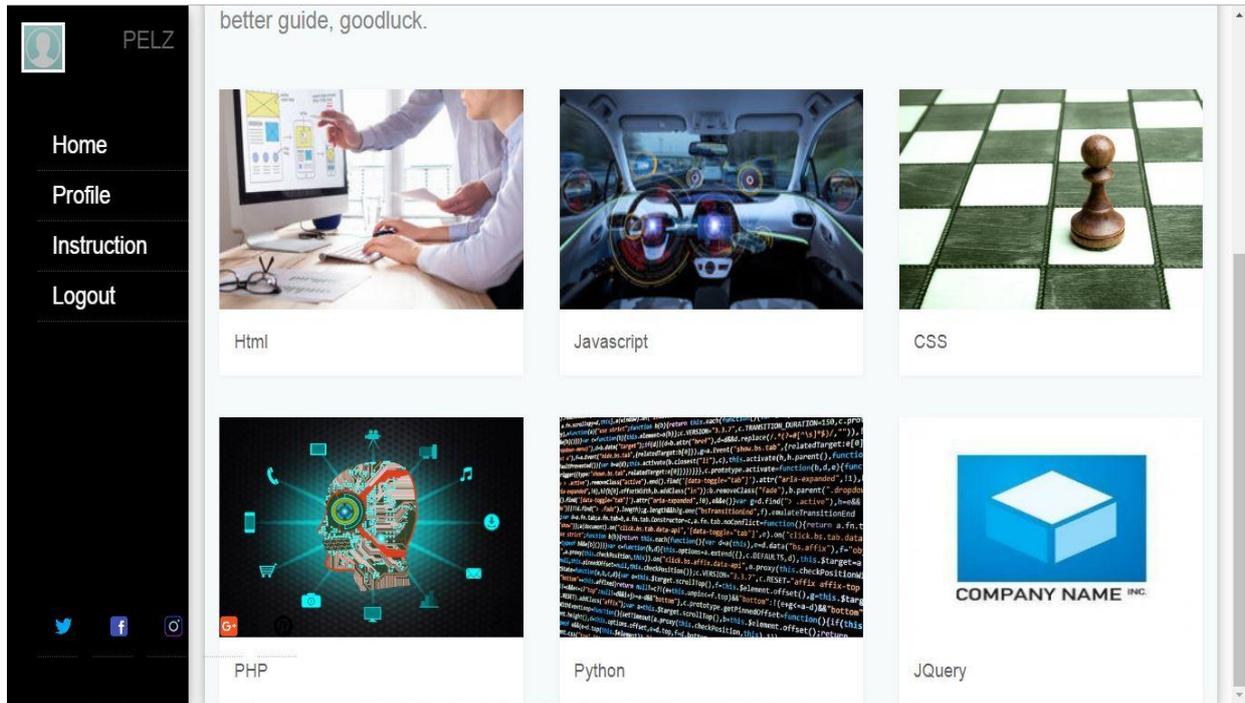


Figure 2: Leaning topic page

3.2.1 Topic Module: The topic page in figure 2, is the interface that allows learners to select a topic under a particular category. The learner would click on any of the topic to get access to the learning content.



Figure 3: Section page

3.2.2 Course Content Module: The course content page as shown in figure 3, is the interface that enables learners to view the content of the course. It comes in video format, audio format and text format. It also has a quiz page for, to evaluate the knowledge gain of the learner.

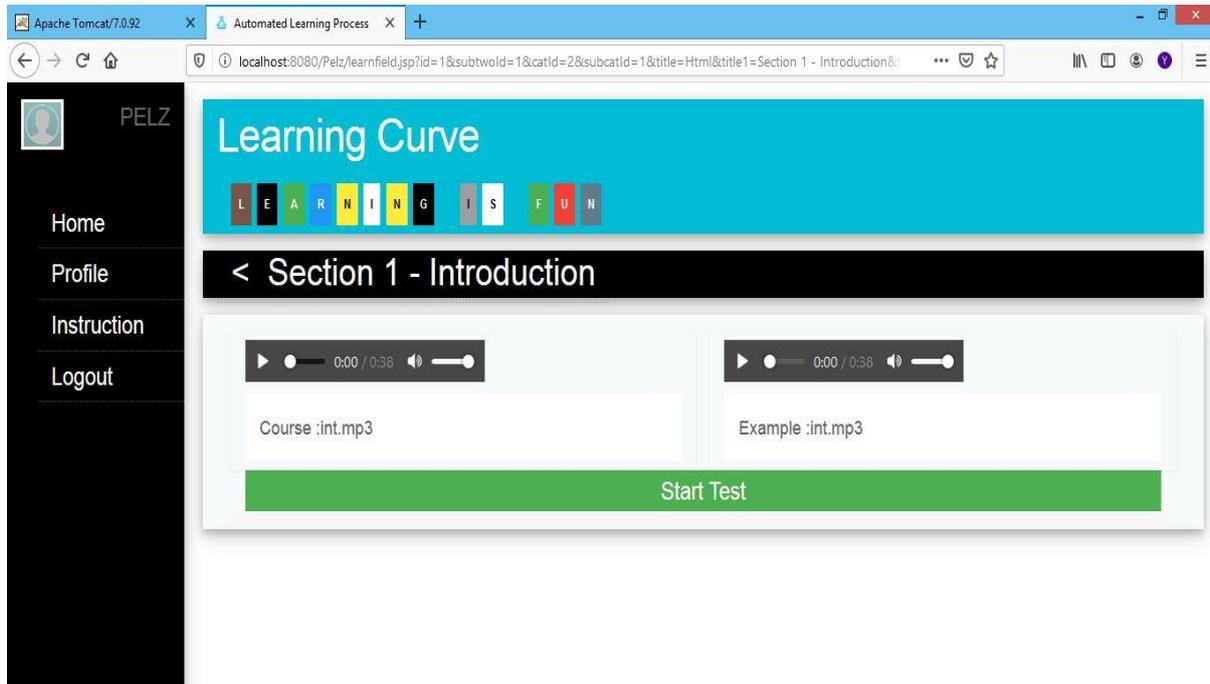


Figure 4: Audio page

3.2.3 Audio Learning Module: On this page as depicted in figure 4, is the interface that present learning content to learners in audible, but systematic voice format.

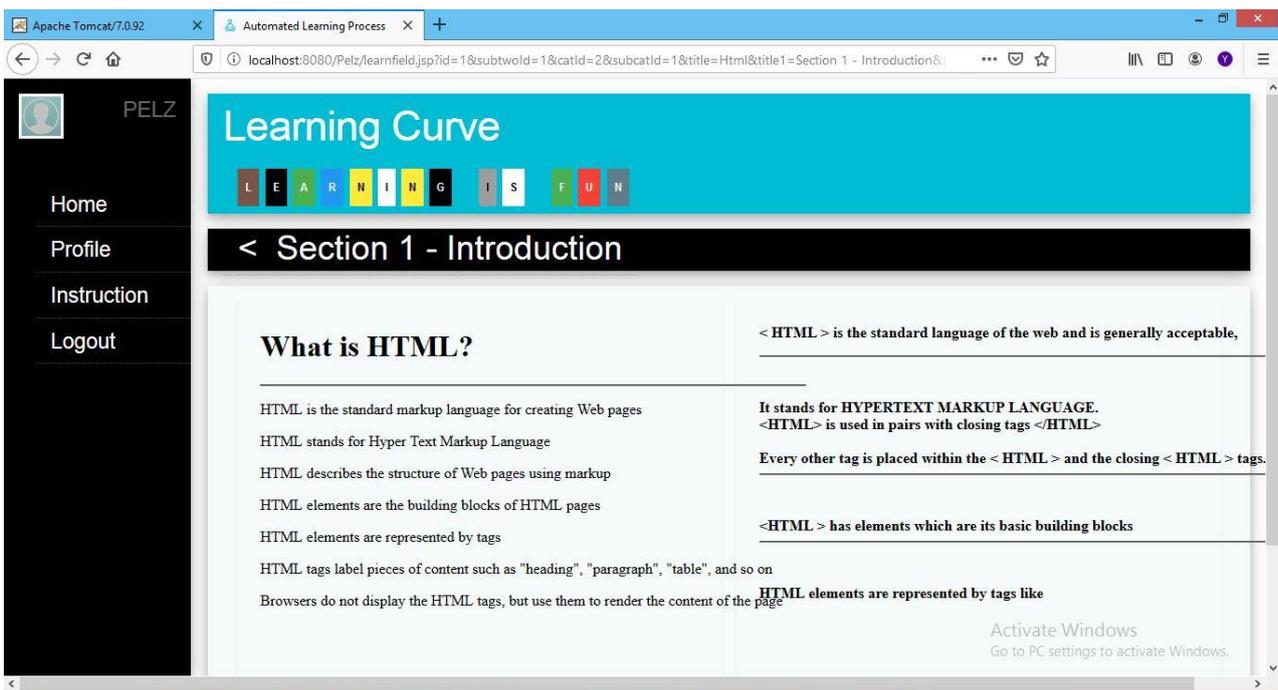


Figure 5: Text page

3.2.3 Text Module: This page is the interface that displays learning content for learners in textual format, as shown in figure 5 above. The learner reads and studies the content on the page for proper understanding.

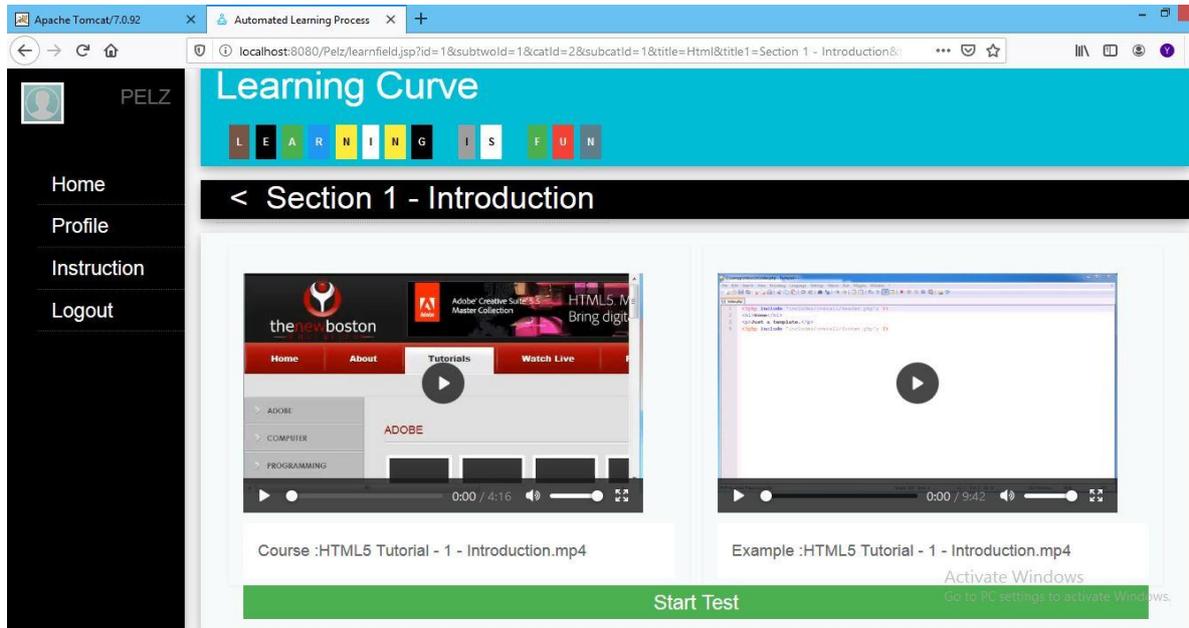


Figure 6: Visual page

3.2.4 Visual Module: Through this page as indicated in figure 6, is the interface that displays learning content for learners in video format. The user click on play icon and tutoring through graphical visual aid will commence.

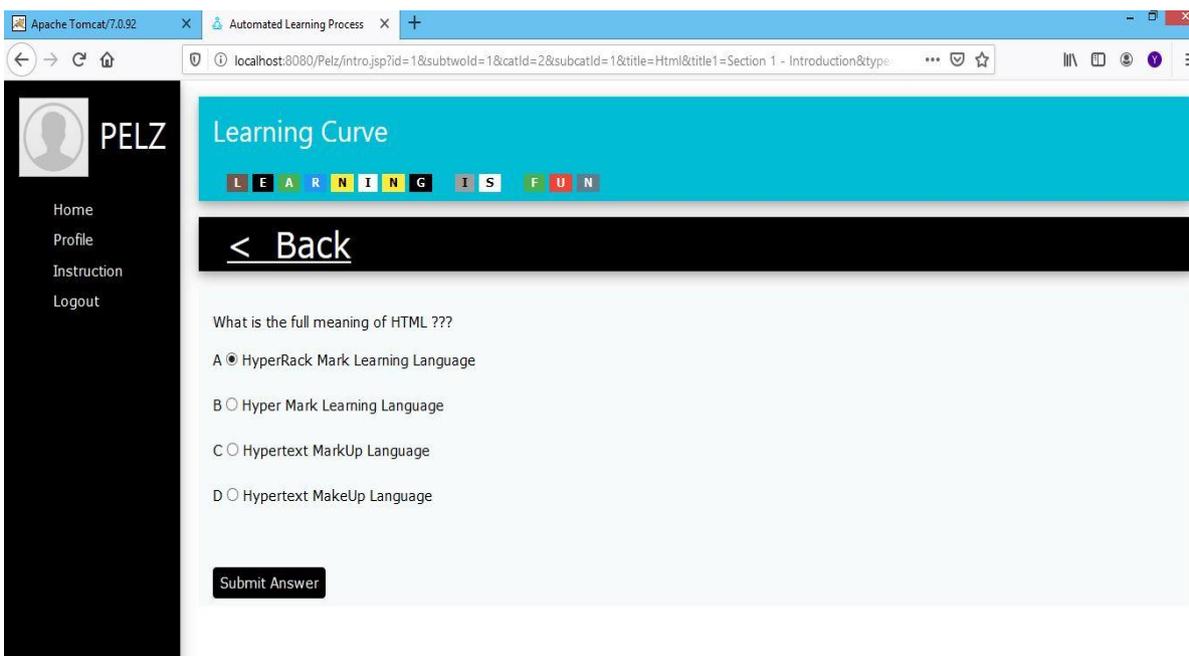


Figure 7: Knowledge assessment page

3.3.5 Assessment Page: From this page as shown in figure 7, is the interactive interface that proof the level of knowledge acquired by the learner so as to ascertain whether learning as taking place or not. Also, the decision to switch to another learning style that will better enhance learner’s understanding is determine from this page as well.

utmost important. In this paper, a web based parametric design evaluation for enhancing adaptive e-learning was implemented with a sole aim of increasing rate of knowledge acquisition by learners. No doubt, the system developed will help learners in quick assimilation of their subject area base on the learning content uploaded.

IV. CONCLUSION

Learning, having been discovered as a cumbersome and complex procedure. Thus, discovering learners best mode of assimilation and adapting learning content to it in order to augment understanding of a choosing subject area is of



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