Adaptive Unified E-learning System
For Supporting Better E-Learning Approach

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Abstract- E-Learning has contributed in enhancing and facilitating education, making learning accessible to everybody to achieve their full potential. Many universities have learning management systems (LMS), which contain rich information. Mostly this information remains restricted to people within the same institution. Making this knowledge available for other people outside the institution can be very beneficial for both learners and educators. This can be achieved through Adaptive Unified E-learning System (AUES). This system will enable both educator and learner to share and benefit from each other’s materials. In such a way, knowledge can be easily transferred between institutions. This system could be applicable in developing countries more than others because it can contribute in the growth of e-learning adaptation and it can help in overcoming some of the challenges facing e-learning in developing countries.

I. INTRODUCTION
In many developed countries, e-learning is the current interest within educational establishments; different tools have been used to facilitate the learning process and to provide course management and content generation [1]. The success of using technology in education depends on the scope to which it can be integrated in a pedagogical grounded framework. The technology is present but it should be looked at as a medium for transferring the knowledge. For that, much effort must be concentrated on how to use this technology to serve different pedagogical needs [2].

Many universities in the developing countries, started to adopt this technology by modifying their network infrastructure. New labs were established, internet connection was provided, different tools for creating e-learning courses have been purchased and many different learning management systems (LMS) were used by different educational establishments [3]. However, these modifications and supplements were not enough to ensure successful e-learning outcomes because other important elements for e-learning success were missing such as flexibility of the system, adaptability towards students needs, reusability of learning objects, interoperability between different learning management systems, effective and official design of electronic content (e-content). These points are the pedagogical needs which are poorly implemented in the developing countries scenario. All those factors are the pre-requisite to successful e-learning which were not addressed by many universities because of the lacking of well-defined strategy towards adapting e-learning technology [4].

The unawareness towards initiating e-learning, resulted in a set of serious problems such as, lack of proper technical support, inadequate training for instructors, insufficient proper staff of developers who will be responsible for creating learning objects and tools.

Most of the universities in the developing countries relayed on instructors to create and design the learning objects who haven’t got sufficient training in creating proper learning objects, also the lack of the needed developers working and advising instructors threatened in a poor educational standard. Instructors were not encouraged to shift from old traditional teaching system and methods to this new technological approach, and the availability of e-learning technology acted in many cases as additional inadequate resources for the students [5].

The students were not attracted towards interacting with e-learning systems provided by their establishments, and kept seeking the needed information on different sites on the internet. Other universities that have provided better quality of e-learning technological approaches and pedagogy, faced a quantity problem. Students learnt by different learning styles and it was hard task to create different learning object which can fit all those learning styles, plus that most of the used learning management systems did not support investigating the desired approach towards learning, [6]. Thus, the students kept again seeking the necessary information on different sites on the internet to suite their demands for knowledge [7].

II. UNIFIED E-LEARNING REPOSITORY SYSTEM
Seeking the desired information on the internet is time and effort consuming process. Better solution, could be oriented towards students demands of knowledge by having the resources through an educational establishment so they can assure that the learning object is compatible with the learning goal offered by the course or the instructor and the learning objects are aligned with the language of instruction. The issue of compatibility is questionable for many universities in developing countries. These universities provide many courses in languages other than their own ones this might lead to students suffering from lack of
learning materials on the internet in their own language. Thus, a promising solution would be in combining the different resources from different universities in the same country or region, in a central repository or as it is called a unified repository system. This solution will allow learners and instructors to share learning object resources among university through one system, which will enable the sharing process for different educational materials, and ensure that all the universities have the same quantity and quality of the provided educational resources in one place [8].

The following figure, shows the structure of the unified e-learning system.

![Fig.1, Unified E-learning Structure](image)

Such solution will solve some of the problems towards e-learning adoption, but again having a big number of learning resources, will be time and effort consuming process for the student and the learner to find the desired learning object, which suites the desired learning style of the learner. We conclude that the adaptive approach towards learning styles should be present too [9].

III. ADAPTIVE APPROACH

Many current researches stated that providing an “Adaptive e-learning system”, would be a good solution for better e-learning. This is performed by providing a system which is capable of producing or reusing different learning objects from which the learner can select the relevant learning object that satisfies his necessities for learning process. The systems judgment for providing those materials is based on a pre assessment of learner’s base knowledge or based on a continuous assessment during the course activities, [10]. The assessment is generated by:

1. Initial student knowledge assessment
2. Student knowledge objectives assessment


Why does the system adapt? Such question usually focuses on the pedagogical model behind the adaptation. Some of the reasons are adaptation to compensate knowledge deficits, maximize educational productivity by minimizing learners fatigue and discomfort, or adaptations to learning styles for an easier introduction into a topic.

To build or integrate an adaptive e-learning system, different models should be present in the structure of the system, such as:

1. The Learning Domain Model: Will contain the following definitions:
   a. Learning Design Definition: is used to specify and describe the Knowledge structure and learning instructional design by specifying:
      i. Learning Objectives
      ii. Prerequisite
      iii. Components (Roles, Activities, Environments)
      iv. Methods
      v. Metadata
   b. Learning Style Definition: it is used to specify how learners perceive, process and interact with learning environment.
   c. Adaptive Rule Definition: the designer of the adaptive system defines it, and it specifies the conditions for executing an action to adapt the content towards students Model and those definitions are initiated based on the test definition results.
   d. Test Definition: it is used to specify four different types of test towards defining:
      i. Appropriate learning style
      ii. Initial knowledge
      iii. Current Knowledge
      iv. Final knowledge

2. The Learning Objects Model: It is used to store all the learning objects and metadata defined by the learning design definitions and created by the instructors.

3. The Student Model: Stores the learners profile data, which is used to adapt the content towards the users needs.

4. The Adaptive Model: Is the engine, which will generate the adaptive content based on the integration of the learning domain definitions with the student model.
5. The Interaction Model: It is used to deliver the adaptive content, for each learner based on the adaptive rule definition of the learning domain model, and to observe the interaction level of each learner based on the learning style definition.

The following figure, shows the architecture of the adaptive e-learning system model.

Fig. 2. Adaptive E-learning Architecture

Universities adopting this solution would be a good solution for them to have enough educational resources, but the case is different than that in many universities in the developing countries. These universities suffer from improper technology and knowledge to build such learning objects, which will reflect the pedagogical needs [11].

IV. ADAPTIVE UNIFIED APPROACH

By looking at the benefits of each sides of the adaptive and unified approach, these approaches could be put together through a system, which would bring the benefits and merge them into one system according to [12]. By building such system, many improvements and solutions to the problems facing e-learning can be achieved, by combining the learning resources from different resources such as universities and companies, plus resources that can be found on the internet into an adaptive unified e-learning system which will ensure a large set of learning resources that can be used by many instructors and students to support their educational process, and will ensure that the adaptive approach is implemented for better learning process for students different learning styles, [13]. Such system will enable many universities to share different learning objects created and will ensure equal benefits among participating universities, and the private sector companies can participate in such system to enrich the quality of its contents or to do a supervision roll on the adaptive unified portal system, which can ensure organization and evaluation or the quality and quantity of learning objects provided [14].

The adaptive unified e-learning approach, will enable the instructor to define the learning domain model, which will interact with the unified repository portal and retrieve the needed learning objects which match the criteria defined by the Learning model [15].

The following figure shows the architecture of the adaptive unified e-learning system.

Fig. 3. Adaptive Unified E-Learning System Architecture

V. IMPORTANCE OF THE STUDY

Using adaptive unified e-learning system for enhancing e-learning will be a relatively new technology in the field of e-learning in the developing counties, and particularly in Arab countries. Consequently, the results of this study will be used to recommend a roadmap and modifications to overcome the current obstacles in adopting e-learning. Such changes could hopefully be incorporated into the existing educational system through future planning [16].

The following benefits are expected from the research study:

a. New established universities can use this system directly before having their own e-learning system
b. The learners will ensure having the same standard of knowledge presented among all the universities
c. The learners will be introduced to different resources of knowledge in an adaptive manner
d. Instructors can share their experience among each other and they can learn and manipulate different ways of providing the learning contents
e. The system will economize the cost needs for e-learning developers and experts
f. The system will help in bridging the gaps between developed universities and other less developed ones
g. The system will be of a benefit to the users with disabilities, since it will provide adaptive learning which suits learner’s needs, and a unified structure, which will ensure different resources types.
VI. CONCLUSION
Building such systems is mandatory for overriding the obstacles in e-learning adoption and lack of resources either as quantity or quality in many developing countries, and this solution can save efforts and financial costing for each of the participating universities which might stand as a burden for adopting this technology.

REFERENCES


