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A Framework for Implementation of E-Classroom System

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E-learning systems are increasingly being developed to replace traditional ways of teaching and learning. Studies have shown that technology can be used to create more powerful learning and teaching opportunities over and above traditional systems. Despite these promising technologies of the 21st century, many places of teaching and learning are yet to attain the minimal educational value. In this paper, we proposed a conceptual framework that describes the design and implementation of an ultimate computerized classroom that uses technology to its fullest to enhance educational experience. The framework can likely improve the learning process, enhance students' performances, and increase students' interest in education. It can also be used to coordinate and manipulate classroom utilities, manage students' attendance and educational contents. In addition, the paper described the objectives and implementation considerations for the realization of e-learning full potentials. This is followed by an explanation of the design and implementation details of the three (3) modules that make the system namely; e-register module, e-control module and e-board module. Benefits of the system are explained and the paper review how technology can be incorporated in school education to provide students with the skills needed for the 21st century.

Keywords: e-learning, e-classroom, e-control, e-register, e-board

I. INTRODUCTION

E-learning can be described as the use of information and communication technologies (ICT) to revise and transform the traditional ways of teaching and learning [1]. In its broadest definition, e-learning is a learner-centered educational system that enables learners to learn whenever, wherever, and whatever they wish, according to their learning objectives [2].

All efforts to implement e-learning will eventually move towards total automation of administrating the teaching and learning processes through deployment of ICT. However, researchers argued that the development of e-learning has not been tested by time and is still in its infancy [1].

E-learning has been categorized into two modes [3]; computer-assisted instruction and distance learning. The former uses computers to aid in the delivery of standalone multimedia packages for teaching and learning while the latter deliver instructions to remote learners from a central site using information technologies.

Many studies [4][5][6] suggested that technology can be used in changing the way education is implemented and perceived. Schools can take advantages of these technologies to make learning faster, cheaper, and more effective. However, the implementation of e-learning needs to be applied within a context, such as environment, resources, digital divide, and some considerations must be taken into account in order to successfully realize its full potentials.

Despite the benefits offered by these promising technologies, many institutions are still using the traditional ways of teaching and learning in which: (a) the task of managing educational content is the responsibility of teachers. (b) Students attendance is managed manually which is inefficient, inconsistent, time consuming and include lot of paper work. (c) Classroom utilities are controlled manually which is also time consuming.

This paper aimed at designing and developing framework that will implement an ultimate classroom that uses technology to its fullest to enhance the educational experience. The framework can likely improve the learning process, enhance students' performances, and increase students' interest in education. It can also be used to coordinate and manipulate the classroom utilities, manage students' attendance and educational contents.

The remaining sections of this paper are organized as follows: section 2 presents related work, proposed framework is presented in section 3, section 4 present some basic considerations and finally the conclusion and future work are presented in section 5.

II. LITERATURE REVIEW

The development of client-server networks and wireless broadband mark the evolution of network technologies [7]. The architecture of these networks enable learners to access the learning materials from a centralized server which is further enhanced to include web-based features that leads to the emergence of internet which support learning through virtual environments [8].

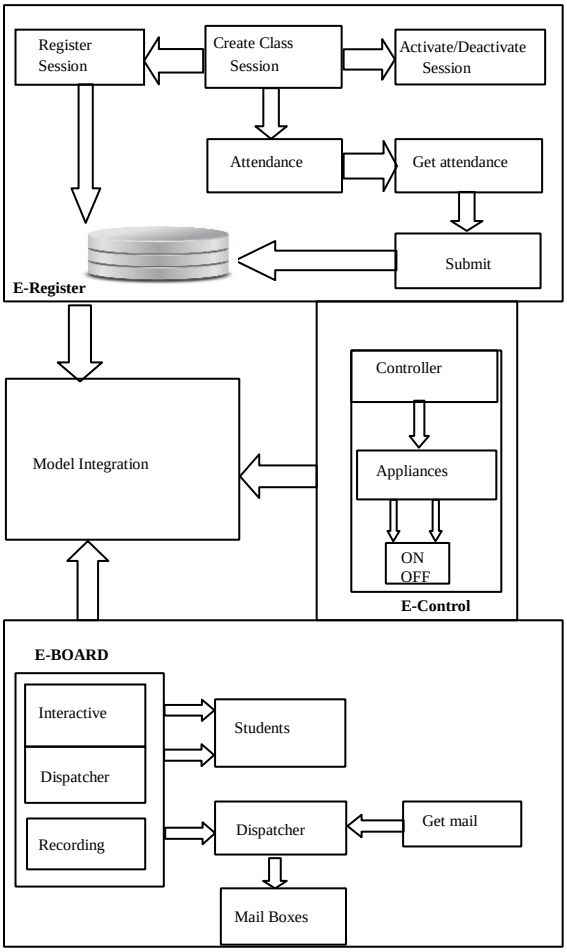
These progressions has further led to the development of wireless technology that support learning through the use of portable devices and currently, a technological revolution is taking place in institutions of higher learning [9].

E-learning is becoming a major component in academia today [10]. In December 2009, [3] evaluated some e-learning systems from well-known universities in Iran. The result of their evaluation from both students and staffs measure a great performance in providing a high-quality education.

In a study conducted by [11], several strategies were presented in building up a prospective e-classroom. While using technology to support learning present numerous opportunities, [12] notes that using technology in learning involves a serious commitment to understanding the different features of this medium and the ways it can be used most advantageously to impart learning.

There are wide discrepancies between universities in the adoption of e-learning, despite the skilled and interested personnel as well as the increasing number of students that in many cases force universities to embrace this educational venture. Many are still struggling to realize the attainment of the minimal educational value [13].

Many researches indicated that computer-assisted instruction in class had a positive effect on teaching and learning. In [14], they argued that merely introducing technology to the educational process is not enough. They proposed a conceptual framework, which describes three main components of the learning environments: content, pedagogy and



technology. However, these three elements should not be viewed independently because they complement each other.

As the adoption of e-learning create many opportunities for teaching and learning activities, a study [12] assert that the true uniqueness of e-learning lies in its multidimensional forms of multiplicative communication and interaction. These interactions are further illustrated in:

1. Salmon's Five Step Model [15], which advises instructors during the learning to consider the students', needs and circumstances in a learner-centered atmosphere.
2. The Content-Communication-Collaboration Model [16] that provide a selection of technologies and methods that support increasing integration of dialogue across the learning activities.
3. Conversational framework [17] which provide opportunities for an iterative dialogue between teacher and student that facilitates high-level cognitive skills.

In a study [18], a framework for evaluating and validating e-learning processes in an integrated environment was proposed. The framework takes into consideration the contextual and pedagogical issues in the concept of e-learning which helps in providing an environment where knowledge management practices take place. It can be noted that the structural changes of e-learning over the past decade has created flexible approaches to learning for students who in the past lacked opportunities due to some factors such as money, distance and time.

To this effect, technology in general has not only improved knowledge delivery but has also acted as a catalyst to combat the barriers of inflexible organizational structures [19]. As a result, many educational institutions have adopted e- learning in their curricula. In fact, institutions that have not yet join this educational venture risk losing out.

However, while e-learning provides a flexible environment of learning, it requires more than just transforming the traditional learning process. Successful implementations of e-learning environments require an understanding of the technology and pedagogy integration for learning to take place effectively [20][21].

The adoption of e-learning has created new educational issues, such as the shift from teacher centeredness to student centeredness, changing work patterns and in some cases the reluctant integration of technology. [22] Points out that teaching techniques used by teachers in traditional courses may also have to be reviewed and modified, as they do not always prove to be effective or necessarily transferable into e-learning environments

III. PROPOSED FRAMEWORK

A significant investment in computer and networking hardware components must be made to establish the proposed system. Following are some of the needed hardware components:

1. Student Computers: The student computers must be sufficient to support the required software. Each classroom should be configured in an ergonomic manner allowing sufficient desk space for the computers as well as textbooks.
2. Instructor computer: The instructor computer is similar to that of the students and may include a projector connection.
3. Network: A network connects the computers within a classroom, and connects classrooms with each other.
4. Printer: The computers in each classroom should be connected through a network to a high speed printer.
5. Server: All e-learning classrooms should be connected through the network to a central high performance computer (server) that is used to authenticate users logging on to the classroom computers and to store shared programs and data.

The proposed system is categorized into three different modules (Fig. 1):

1. E-Register Module

This module manages and controls all activities between student-student, student-instructor, and instructor-administrator interactions. It comprises of registering students, managing their attendances, handling class session etc.

2. E-Control Module

This module has the responsibility of controlling all the classroom utilities; it switches on and/or off the computers, printers, projector, Air Conditioners, Lamps etc. It controls all the classroom electrical appliances.

3. E-Board Module

This is the module that interact and dispatches information to students; it also records the displayed contents and dispatches it to the students' mails.

With the proposed system, an efficient and effective e-classroom system will be developed after all the modules are integrated. Students attendance will be managed automatically using barcode reader. In addition, electrical appliances will be controlled directly from the proposed system and all educational materials will be archived in the system's repository, so that both staffs and students should have access.

The most peculiar feature of the proposed framework that differentiate it from other related systems is its ability to integrate the core modules that any good learning environment must possessed; the e-register, e-board and e-control modules. In addition, it managed students' attendance and dispatch lectures to them.

IV. BASIC CONSIDERATIONS

As we have pointed out in section 1, even though e-learning makes learning faster, cheaper, and more effective, there are some considerations which must be taken into account when implementing the e-learning classroom environment:

1. **Useful Technology with Sound Design**: It is not sufficient to simply provide computer technology in the e-Learning classroom, rather it is imperative to provide the most useful and appropriate educational technology [8]. Inefficient allocation of funds and technical resources into a poorly designed computerized classroom will continue to disappoint [23].
2. **Cost:** Initial cost, recurrent costs, and cost-effectiveness are important issues in the e-

Learning classroom [24]. In addition to the initial investment in e-Learning technology it is also important to take into consideration hardware and software upgrades, instructor training, and technical support costs.

Instructor Use of Technology: Instructors need to become proficient in the effective use of the computerized classroom [23]. This includes not only use of subject-related programs, but also general computer use,

3. **Instructor Use of Technology:** Instructors need to become proficient in the effective use of the computerized classroom [23]. This includes not only use of subject-related programs, but also general computer use, keyboarding, and the use of classroom management programs.
4. **Ergonomic and Safety Considerations:** Ergonomic considerations such as lighting, air quality, and seating position are important in the computerized classroom [25]. It is also important to consider the placement of computer cabling to ensure safety requirements are met.
5. **Teaching Strategies:** Teaching as well as learning strategies must be assessed and revised to fit the e-Learning classroom environment [26]. The interlacing of lecture presentation and practical computer work is an excellent way for students to engage in the full e-learning experience [27]. Students become more interested and involved in their education and start asking more what-if questions which the instructor can address immediately.
6. **Content Development:** Preparation of instructional material, tutorials, tests, and activities that use the technology can be a formidable task [8]. This is an important and ongoing process that is essential to the successful implementation of e-learning.
7. **System Sustainability**: It is extremely important to have a group of system administrators and technicians for hardware, network, and software maintenance. This is imperative if the e-Learning classroom is to be in continuous working order.

V. CONCLUSION AND FUTURE WORK

In today's increasingly technological world, educational institutions must produce students who are able to make effective use of technology. The early introduction of technology and its ongoing implementation throughout the student's education are important in meeting this goal. The proposed framework provides a means to improve learning process, increase students' interests, and ultimately enhance students' performance. The experience has shown that if the framework is to be implemented well, it can produce students that are technologically competent and will provide an educational environment that guarantees students success. In future we hope to transform the framework into a working system.

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