Challenges of Game Based E-Learning - a Study

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*Abstract— **Now a day E-Leaning is rapidly replacing traditional teacher centric conventional education systems. It has some implementation issues which have been stated by different researchers through different perspectives. In this paper we are emphasizing particularly the implementation issues of Game Based E-Leaning. Here we propose the different constraints which are related to the technical and motivational parameters subject to imparting Game Based E-Learning.***

Keyword: e-learning; ICT; LMS; AeLS; motivation;

1 INTRODUCTION

E-learning is continuously expanding, looking forward to new features and ideas to improve the learning process and the learning experiences[1]. Now a day technology is changing the practice of teaching and learning at educational institutions around the globe. With the appearance of Internet and web technologies, education institutions have been seeking to utilize the use of e-learning technologies to satisfy the growing demands of different teaching needs in distance learning education[2]. In this paper we first discuss, what actually e-learning means and what are the advantages of using e-learning over traditional learning systems. We also try to find out the major challenges of it. After that we are going to describe game based learning, which is relatively new segment of e-learning. Then we try to find out the technical and motivational issues related to that particular field with some solutions which are already given by some researchers. In this paper we are trying to focus in a simple question-How effective the game based learning is and what are the issues that arise to develop such a system? We also give some ideas about how we measure and evaluate the impact of it on learners. And at the last we explain the future scopes of game based e-learning for researchers and developers.

2 E-LEARNING & ITS PRESENT CHALLENGES:

Reference [3] reported that "growth in e-learning is very fast as institutions compete for a share of the growing and changing demand for education. E-learning could have potential and major effects on the way education is designed, implemented and delivered". A greater number of educational institutions around the world are pursuing this technology with aims of minimizing costs, increasing services and improving usefulness in the education sector. Advancement of electronic learning technologies have also provided significant opportunities as well as new threats to organizations in education sector.

There are various definitions of electronic learning [4]. This is due to the different views that have been presented by experts, particularly since the term itself is new in the field of knowledge. Reference [5] defines e-learning as the use of ICT [Information and communication technologies] to improve and support learning; hence it consists of a wide range of tools and technologies: E-mail, Internet, Video tutoring, virtual classrooms etc. Reference [4] refer to e-learning as " A learning process in which learners can correspond with their teachers and access learning ,materials , over the Internet or other computer based network". Also, H. Muhsin [6] noted that e-learning is the use of internet technologies to produce a wide range of solutions that enhance knowledge and performance. E-learning has the potential to positively manipulate the education sectors [7].

The actual origin of e-learning is computer based training ,which actually acted as an agent to automate education, replace a paid instructor and develop a self paced learning[8][9].But unlike CBT, e-learning provides learning without barrier of time, distance and customized to the business need of individual. E-learning is defined as "The delivery of customized ,broad, active learning content in real time, facilitating the development of communities of knowledge, connecting learners and practitioners with experts" [10].

2.1 Advantages of e-learning

The education sector is characterized by a increasing interest in e-learning which is based on significant trends in the improved application of e-learning technologies

[11][12][13]. The most considerable benefits of e-learning, according to the literature, are that it : Firstly, offers an " Anywhere and anytime" learning environment that is independent of time and constraints of distances[7][14][15][16]. Secondly, it supports synchronous and asynchronous communications in different formats ranging from text , voice and audio [7]. Thirdly, it provides better educational chances for individuals who are lacking by geographical, physical or social circumstances [7][17][15]. And finally it reduces the cost in respect to the traditional educational systems in terms of providing services[4][18][19][11][20]. The cost advantages center on the cost saved in terms of travel and time , minimizing the costs for teaching materials , equipments, classrooms and other facilities, and capability of e-learning to provide large numbers at a single time , or over time , with minimal added cost.

2.2 Challenges of e-learning

Research on e-learning has recognized the following challenges as creating an issue: Deficiencies of ICT infrastructure [11][2][21][22][23], a lack of understanding [23][24], problems in access to the internet[2][4][21][11], a lack of trust and security [25], problems with quality assurance[26][24]; a lack of guidance[11][4][25]; a lack of support and financial support[4][24]; problems with computer literacy[27][24][28][21];

3 GAME BASED E-LEARNING

Generally games are developed for pure fun and entertainments. But it also interactive and attractive in nature and can be made to simulate the real world situations. "A game is task-oriented rather than content focused; it encourages practice and mastery rather than role memorization"-C. Shaun [29]. Games can be developed to allow students to strategically learn and practice real time problems and their solutions in a virtual world which simulate the real world actually [30]. So this can be an effective tool for e-learning systems.

The integration of the games into educational sectors and how to efficiently distribute the games to the students are still open question. Among them two basic questions are to be solved. The first one is how the games are delivered to students. The possible outcome of this problem is it can be integrated with existing LMS systems. And the second most important question is how to measure student's performance. Because it is very difficult to measure emotions at run time. But some major works were done to solve this particular issue.

3.1 Technical Issues

Distributions of game based e-learning materials are very complex in nature. There are several related issues which have to be considered before implementing such type of e-learning courses. First issue is to make it logically platform independent. Because developers are using different tools and resources to make such game oriented study materials which have to be interactive as well as goal based programming in nature . But the target users are using various platforms to play and learn such materials. It is not possible to develop those modules for every platforms. So we need some pre existing structure which can be used as the base of game based learning systems. The probable solution is to integrate these games with pre-exists LMS systems. Another solution is to use some stable game engines for this purpose. Secondly we cannot just provide any kind of materials at the students and expect them to respond. So we need some high quality contents built with solid educational principles to reach the students. Another issue is, platform dependency and high quality content means huge maintenance cost, cope with varying platforms and continuously changing technologies. Delivering games is very much related to the incorporation of these games with other learning stuffing in bigger courses. It needs to be user friendly for students first. But interoperability cannot be done in easy manner. Platform independence and maintaining high quality contents at a same time is not feasible for such projects. So, we have to tune our contents in a manner that they can be integrated with pre-existing LMS.

The learning objects (LO) model [31][32] addresses this issues by proposing a development strategies of learning content based on self-contented pieces that can be assembled in courses, supported by uniform interchange formats to simplify interoperability of contents among systems and avoid vendor lock-in .We can go for some standards also like IMS content packaging (IMS CP) specification [33]. It can produce contents that are easily imported or exported to the LMS like Moodle [34], Sakai [35] etc.

3.2 Motivational Issues

Motivation is a human emotion which involves thought believes & determination to achieve a goal. E-learning systems on the other hand, have evolved over the past years towards adaptive e-learning systems that make use of the learner's performances, knowledge, goals in order to adapt the delivered content. But despite of all these techniques, reaching and engaging today's learners is still considered a challenging task [36], while the learning method may be considered by the students to be boring and forced. However while in traditional face-to-

face learning, teachers have direct contact with the learners, thus being able to analyze the whole learner's activities, in the e-learning context, motivation detection and measurement are a more challenging task. This is because learner's speaking tone and behavioral activities cannot be analyzed as in traditional learning that involves direct contact with the learner.

Some major works had been done by some researchers to minimize the above stated problems. PlayLearn [37], a component that provides support for playing educational games with AeLS's (Adaptive e-Learning Systems), with a motivation based game level adaptation technique [38]. According to De Vicente and pain [39] the capability to spot student's motivational state during an instructional communication can bring many benefits to the performance of an adaptive e-learning system. Therefore, various motivations based assessment solutions have been projected in e-learning. In the same context, .Hudlicka [40] shows the need for having affective games engines not only in educational games, but also in games in general. According to self-efficiency [41] theory of motivation, a person must have confidence that(s) he is capable of solving , executing and pursuing that task. Self-efficiency represents the parson's belief and determination. Self-belief of efficiency makes people to set for themselves challenging goals and to make action plans, in this way people developing strong perseverance [41]. Ryan and Deci [42] presented the self-determination theory as a new approach to motivation and individuality. For them, motivation concerns the energy, the persistence, and the path that a person is taking in his /her activities.

Since motivation represents a vital factor for learning, many e-learning systems try to reach and engage students by providing them with instructional content that is motivating. Ghergulescu [38] presents a research work on measuring motivations and identifying the elements which detect it. Table.1 produces the facts coming out from their research [38].

TABLE I.   **MOTIVATION MEASUREMENT IN E-LEARNING**

Motivation indicators	Learning variables measured	Research	Measurment type	Assesment Type
Control,challenge,independency,fantacy,confidence,effort,satisfaction	Response given by students	De Vicente & pain 2002	Direction interaction	Rule inference
Engagement	Question response time, answer correctness	Beck 2004	Log based analysis	Item response time prediction
Confidence, confusion, effort	Time to perform task, reading time etc	Qu & Johnson 2005	Log based, eye tracking analysis	Prediction model
Confidence, effort	Question response, help request	Kim et al.2007	Direct interaction	Fuzzy logic function
Engagement, source	Average session time,exam activities,quiz activities	Hershkovitz & Nachmias 2009	Log based analysis	Log files computation
Importance, expectation	Linkert scale answers	Takemura et al. 2009	Direct interaction	Direct computation

Assessing and measuring motivation during the interaction with e-learning system is difficult because information about learner's vocal tone and activities are difficult to be collected. Therefore, motivation is measured by analyzing other type of facts that is collected by one or more of the following three methods: direct interaction with the learners, monitoring their communication with the system and monitoring their behavior using additional equipments.

Here we also discuss about some previous research works which were successfully implemented in this particular field. Rebolledo-Mendez et al. [43] have introduced a motivation model based on empathy for artificial intelligence driven avatars with virtual worlds. The aim is to offer an avatar in the virtual world with the capabilities of coaching in learning situations.

Derbali & Frasson [44] investigated player's motivation during a serious game. The assessment of motivation was made using and electroencephalography (EEG).

Probabilistic models that assess student emotional reaction during interaction with an educational game were also investigated [45].

Often games take time as a variable when assessing the player. In this way, the constraints forced by the need of the range for time variables may depart in the game context. This research proposes that motivation can be measured in real time in game by taking into consideration indicators such as , competence, effort, source of motivation and interest.

4 FUTURE WORKS AND CONCLUSION

There is a noteworthy achievement in approaches to pedagogy and student learning methodologies across education towards more tailor made and learner concentrating approaches enabled by the use of E-Learning technologies. In this regard, we believe that interactive strategies have the scope to enhance the

development of knowledge and performances of the learners.

In this paper we have studied that the one of the major challenges of imparting Game Based E-Learning is it's high cost. So in spite of embedding Game Based E-Learning modules with existing LMS, for better performance we can also provide some Game Engine supports to that system. Several researchers proposed Question-Answer based assessment methodology to measure the performance of the students. But we think if Sensor based scientific performance measurement can be a better metric to judge the interest and the involvement levels of the learners.

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