Human Computer Interaction & eLearning: *An overview of Enabling Technologies in Student Centered Environment*

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Abstract: **Armed with the advanced information and communication technologies, eLearning is having a far-reaching impact on learning in the new era. Learning is shifting from instructor- centered to learner-centered, and is undertaken anywhere, from classrooms to homes and offices. The concept of traditional education does not fit well with the new world of lifelong learning, in which the roles of instructor, student and curriculum are changing. eLearning has been crucial to meet this new challenge. The new technology look at new development of this area such as: designing for inclusion, personalization, blended learning and consistency in computer collaboration and delivery of online education need of remote education "teaching by telling" to "learning on demand" or "learning by asking or doing". This research is carried out to investigate the different methods of eLearning systems relate to learner's value by comparing designs of personalized and adaptive eLearning systems. Also this will examine the appropriate eLearning tools for different focus groups to satisfy the learner's experience of eLearning while identifing the barriers which can be affected to the successful implementation of eLearning tools.**

Index terms: eLearning, learning style, learning methods, learning content

I. INTRODUCTION

The globalization of education goes hand in hand with an increase in distance learning programs, supported by a rising utilization of internet-based electronic learning (eLearning) systems. eLearning systems help educational programs cross borders of time and space. The success of such educational programs depends to a considerable extent on student acceptance and use of these eLearning systems.

The radical changes in learning needs and technology are fueling a transition in modern learning in the era of the Internet, commonly referred to as eLearning. Essentially, eLearning is another way of teaching and learning [1]. In its broadest definition, eLearning includes instruction delivered via all electronic media including the Internet, intranets, extranets, satellite broadcasts, audio/video tape, interactive TV, and CD-ROM. All efforts to implement eLearning will eventually move towards total automation of administrating the teaching and learning processes by means of a software known as Learning Management Systems (LMS). eLearning systems, or Virtual Learning Environments (VLE), are rapidly becoming an integral part of the teaching and learning process [2]. A VLE is a web-based communications platform that allows students, without limitation of time and place, to access different learning tools, such as program information, course content, teacher assistance, discussion boards, document sharing systems, and learning resources

In the literature review section of this paper will explain the past concepts and frameworks of eLearning which could be useful in self -learning environment. Methodology section explains the design of the research in finding the appropriateness of eLearning and how it could be adopt into the existing environment with new strategies of technology opportunities. In conclusion this study discuss the implications of adopting a new eLearning system on adult learning environment, wherein educators no longer serve solely as distributors of content, but become facilitators of learning and assessors of competency.

II. LITERATURE REVIEW

The student are behave according to the different learning styles. The term "learning styles" refers to different ways students absorb and process information. Inherent characteristics, life experiences and requirements imposed by learners' current situations impact their styles [3]. Educators who address individual styles can increase learners' chances of success and satisfaction. A variety of learning style models exist. In many of these, learners can be described as:

- *Active* - These individuals are most successful when they're directly involved rather than passive. They prefer realistic, hands-on experiences.

- *Emotional* **-** They like to interact with others. The best setting is unstructured learning.

- *Observational* **-** These learners want to watch, listen and explore. They're primarily self-directed.

- *Interacting* **-** While they're independent thinkers, interacting learners also want to analyze the subject matter through group discussion.

Though important, timeline is not the only important aspect of eLearning. Based on the student's different learning styles, educators need a variety of pedagogical approaches [4]. There are mainly two types of approaches called active and passive. In active learning students immediately apply learning, such as through teaching others. Meanwhile passive learning let them absorb information during demonstrations.

eLearning tools mainly categorized into two learning methods called synchronous learning and asynchronous learning [5]. Synchronous learning means an events take place in real time. The learning happens between two people and requires both them to be present at a given time. Examples of Synchronous Learning tools are chat and IM, video and audio conference, live webcasting, application sharing, whiteboard, polling, and virtual classrooms. On the other side asynchronous learning events are time-independent. A self-paced course is an example of Asynchronous Learning because online learning takes place at any time. E-mail or discussion forums are examples of asynchronous communication tools. In such cases, students ideally complete the course at their own pace, by using a Learning Platform like an LMS. Examples of Audio/Video, E-mail, Discussion forum, Wiki/Blog, Webcasting/Conferencing, Simulations and Game-based learning.

Regardless of the type every eLearning system should be effective on its use. Effectiveness means satisfying user expectations. Different researchers shows that the effectiveness can be the measurement of return on investment [6], analysis of learning outcome [7], content quality, systems quality and service quality [8]. There are certain features unique to eLearning that should also be addressed, such as synchronous/asynchronous interactions, open access to vast resources and distributed learning. There are many Content Types focused on eLearning. Those are totally based on the need analysis and the type of learners [9]. The most common Learning Content Types are as follows:

Learner-centered
- Learning media provided to keep the focus on learner's end.

Personal
- Facilitators should be able to follow the learners' progress and performance individually.

Engaged
- It depends upon developing the storyboard of learning programs

Interactive
- Frequent learner interaction is needed to sustain attention and promote learning. Scenario based learning is an example.
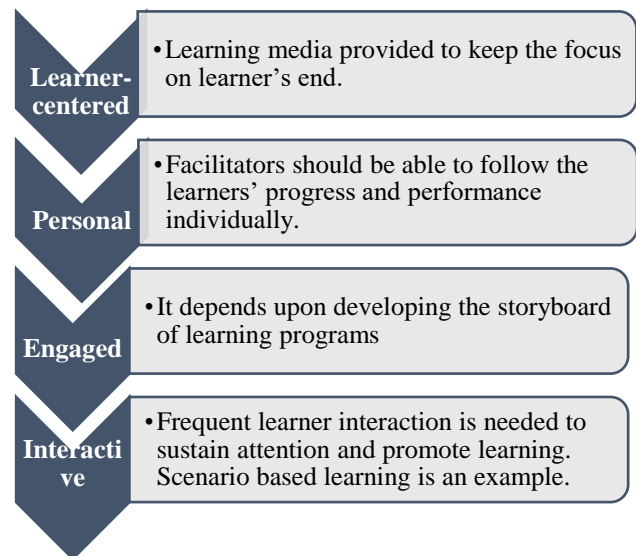
Figure 1 Learning Content Types

According to the above stated facts the infrastructure of eLearning should be clearly understand the learning style models, the learning approach as well as the leaning content type in order to select the appropriate eLearning tool category for focusing group.

III. OBJECTIVE

The main objective of conduction this research is to identify the design, learnability, and use of different eLearning tools such as video, quizzes, discussion board and dynamic voting and the design of novel education technologies such as mobile learning and game learning. The next objective is to understand the learner's experience of different eLearning tools and evaluation of various designs of personalized and adaptive eLearning systems. According to the findings the final objective is to develop a design guideline and patterns for eLearning and computer assisted assessments.

IV. METHODOLOGY

In the initial step, the research conducted a qualitative data gathering and analysis of data collected from various students of eLearning over 2 1/2 years of time. It was important to understand the depth of learning content, with agile in the modern era. A qualitative study designs assist understanding the eLearning culture which focus on individuals learning experience lively and also getting experienced on student centered learning culture.

The eLearning content was designed and developed in smaller manageable chunks known as learning objects (LO). LOs are the small units or building blocks of instruction that can be taken as

stand-alone units of instruction even when it is not embedded within a larger structure of content.

The participants were monitored on the given content using both synchronous and asynchronous learning methods. Observation and analysis of this phase is conducted between the shared acts which can be facilitated by involving different groups with different levels of expertise. Apart from that the effects of Web 2.0 technologies such as web based workflow systems are also analyzed to identify and evaluate different eLearning tools with the design of novel educational technologies in order to fulfill the learner's requirement and to understand the learner's experience of different eLearning systems.

Learner satisfaction was evaluated after the experiments via a questionnaire, which employed a 5- point Likert scale ranging from extremely dissatisfied (1) to extremely satisfied (5).

V.   DISCUSSION

In comparison with traditional face-to- face classroom learning that centers on instructors who have control over class content and learning process, eLearning offers a learner-centered, self-paced learning environment.

The students are randomly assigned into the experimental groups. Students in traditional class room groups took the regular lectures in a classroom and were allowed to ask the instructor questions, while students in eLearning groups were asked to use the interactive e-Classroom in a lab, and attended the lecture via the Internet. The same instructors who taught the class room group also prepared online course materials for the eLearning groups to ensure the lecture content was consistent across all experimental groups. During the study, every group had the same amount of time for lectures and went through the same experimental procedure. The learning effectiveness was assessed by objective measures of student learning (test grades) and subjective measures (perceived satisfaction). Each student was given a pre-lecture test and a post-lecture test (closed-book, closed-notes) on the content covered by the lectures and used the difference between the two scores as the individual learning performance.

In a traditional classroom, learning is highly instructor centered and sequential. Although many instructors encourage students to ask questions during lectures, for various reasons, many students do not question or ask for repetition in the class even when they have difficulty comprehending the lectures, and they do not have an opportunity to re-experience the lecture content selectively. When a student does not understand a specific concept, he or she can select a particular piece of content to review until it is fully understood.

Although used different learning contents and students in the two experiments, the results were consistent: the test grades of students who took lectures through the Interactive e-Classroom with interactive control were significantly higher than those of students in traditional classroom groups (Table 1).

Content types	Study 1 :	Study 2

LO 1	Average score	:Average score
Class room group	10.50	27.00
eLearning group	13.00	38.50
LO 2		
Class room group	12.50	32.00
eLearning group	18.75	38.00
LO 3		
Class room group	10.00	28.00
eLearning group	13.50	30.50
LO 4		
Class room group	18.00	42.00
eLearning group	19.50	48.00
LO 5		
Class room group	17.25	43.00
eLearning group	17.00	46.00
LO 6		
Class room group	16.00	38.00
eLearning group	19.00	39.50
LO 7		
Class room group	15.50	40.50
eLearning group	15.00	41.50
LO 8		
Class room group	13.00	37.00
eLearning group	16.00	43.00

Table 1 Pretest & post Test marks

According to the PSPP statistical software analysis the values for above two study cases as below.

Valid cases = 16; cases with missing values(s) = 0

variable	N	Mean	Std Dev	Min	Max
Study1	16	15.28	2.96	10.00	19.50
Study2	16	38.28	6.13	27.00	48.00

Table 2 Descriptive Statistics Values for study 1 &2

Model summary (study 2)

R	R Square	Adjusted R Square	Std. Error of the Estimate
.82	.67	.64	3.67

Table 3 Model Summary for Study1

ANOVA (study 2)

	Sum of Square	df	Mean Square	F	Sig.
Regression	375.85	1	375.85	27.97	.000
Residual	188.14	14	13.44		
Total	563.98	15			

Table 4 Regression Analysis Result

Coefficients (study2)

	Unstandardized	standardized		

	B	Std. Error	beta	t	Sig.
(Constant)	12.41	4.98	.00	2.49	.025
Study1	1.69	.32	.82	5.29	.000

Table 5 Coefficient Values

The difference in satisfaction levels of students in the classroom and eLearning groups was not significant. In the post-study questionnaires, most students in eLearning groups reported they liked the multimedia presentation in the e-Classroom and were satisfied with the self-controlled learning process. They also thought that sufficient interactivity and flexibility was critical to an eLearning environment.

The graphical comparison of pretest and posttest marks are displayed in fig. 2 as below.
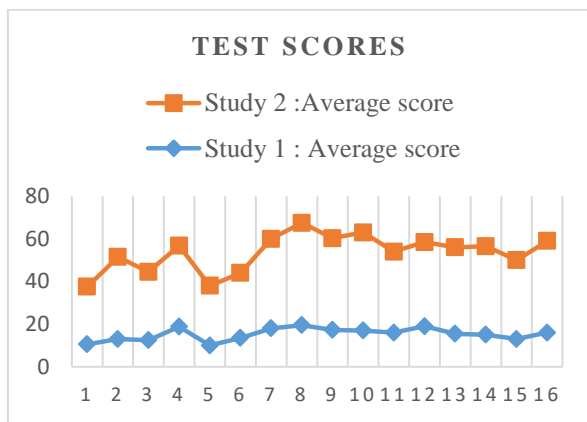

Figure 2 Pretest & posttest marks

The student's retention rates are helps to identify the right methods when choosing eLearning tools. Many types of eLearning can be created with advanced development tools, which are suited to the needs of the modern workplace learners. There are various types of eLearning solutions that can be employed to train the learners (fig 3).
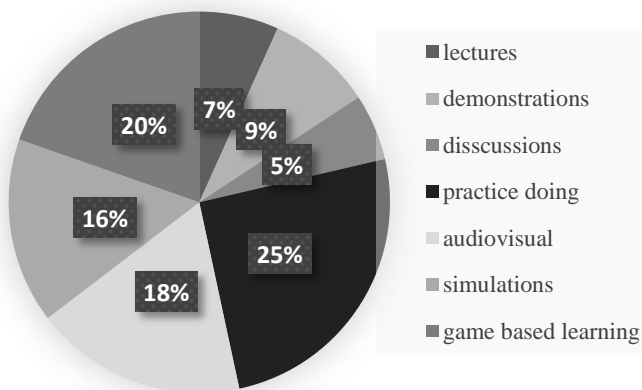

Figure 3 Average Student Retention Rates

It is more crucial to select the type that best suits the needs of the learner, keeping in mind the available technologies that would help them to access in eLearning methods. Most of the eLearning methods are Synchronous and Asynchronous in nature, which depends upon the learner's need and the learning objectives. The following examples state different eLearning tools that can be adopt in educational system.

- *Self-study* - One of the most common method which uses wiki, blog and any reading material like presentations, pdf files to offer the initial knowledge to the learners. This also allows Subject Matter experts to the group of learners on the classroom training to resolve their queries and doubts.

- *Video/audio tape*- This is the second most common method to create demo video to train the learners. It also helps to create one way of learning assets which help the learner know about the basics by watching.

- *CBTs and WBTs* - In this type of learning, contents are made available to the learners in the form of a CD or a Computer-based training (CBT), which can be run on the learner's system. Similarly they can also be made available through Web-based training (WBT), which utilize the internet as a platform like a Learning Management System. The courses are self-paced, and the learner has no interaction with an instructor or fellow learners. This works very well for adult learners who are more motivated to learn, in order to learn new skills, update their resumes and attain professional excellence.

- *Blended eLearning /Instructor-led (ILT)* - This combines both the Synchronous and the Asynchronous ways of learning. A blended approach works best where the classroom is utilized to conduct exercises and interactions. These exercises cannot be conducted in eLearning delivery as peer interaction is limited.

- *Mobile Learning*- The easy availability and affordability of mobile devices has created the space for mobile-enabled learning or mobile learning. The capabilities of the mobile device, including disk space, internet connectivity, and the screen size has to be taken into consideration.

- *Social Learning* - The impact of social media is very strong and it can be utilized for corporate learning as well. Learners collaborate and network on social platforms to discuss problems, queries, and experiences. Social collaboration platforms are also built within the LMS so that the learners do not have to discuss on public platforms and the learning which emerges from mutual collaboration resides and grows within the LMS.

- *Simulation* - Simulation eLearning is highly interactive and relies heavily upon graphics, video, audio. Importantly, there are often custom simulations videos or games, which could very well include 3D components. New software

training is an example of a course that often includes a high degree of interactivity and simulations.

- *Game-based learning* **-** Games are considered to be fun by all, but they can be a powerful medium of experiential learning as well. Such contents focus on creating engagement and motivation for the learners to learn the things while they play.

Choosing the right eLearning Methods, totally depends upon the proper need analysis of the organization and upon the nature of the audiences and their collaboration methods. It can not only make the development process more streamlined and productive, but it will also provide a better eLearning experience for the audience. Development of an eLearning tool should undergo with a well-defined process. According to the fig. 4 the development process can be consist with several identical steps as below.
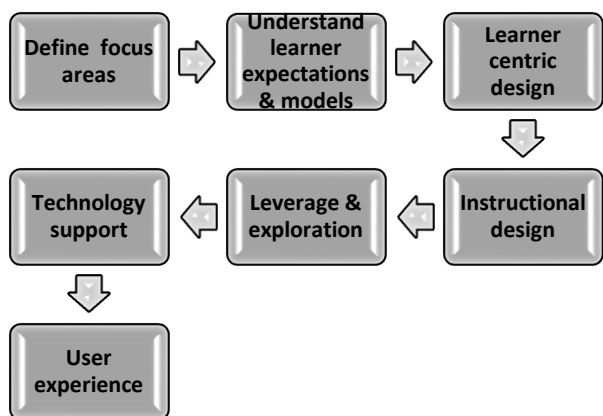

Figure 4 eLearning Development Process

There are also logistical concerns about eLearning. For instance, teaching on the Internet requires much more preparation time than in-classroom teaching. Furthermore, certain types of learning materials may be too difficult or too costly to be taught online. Other important issues in eLearning must also be taken into consideration. Issues of trust, authorization, confidentiality, and individual responsibility must be resolved. Owners of intellectual property should be properly compensated. Security on the Internet is a growing challenge, primarily due to the open access by the public to this universal network. In addition, since multimedia materials are heavily used in eLearning systems, a high-bandwidth network is a basic requirement for efficient content access.

VI.   CONCLUSION

Many organizations are now transforming their learning and development programs to the eLearning domain. But choosing the right methods for their business based on their needs is still a challenge. Choosing the right eLearning programs depends upon

many factors like proper need analysis, target audience analysis, task analysis, topic analysis, and evaluation methods [10][11]. Apart from these analyses important principle of Learning Pyramid created by the National Training Laboratories can be assist on selecting appropriate eLearning tool beforehand. Choosing the right delivery methods directly impact effectiveness and cost benefit for the organizations [11]. Assessment is one of the most crucial phases of delivering eLearning. Effective eLearning assessment is essential for everything from delivering formal compliance requirements to deciding how courses need to be improved [12].

It's also important to determine why students are involved in the program and what they expect to achieve. Before a course begins, targeted surveys and questionnaires relay information about needs, assumptions and deficits from learner to educator. At the outset of a course, an educator should state specific learning expectations [13]. Students will understand the level of commitment involved, indications of success and benefits they'll achieve. With knowledge of eLearning possibilities, learner motivations and learning styles, educators create eLearning programs that address both content requirements and student needs. eLearning requires more maturity and self-discipline from students than traditional classroom education, which may explain the higher dropout rates in eLearning programs compared to conventional programs.

Adopting eLearning and its technology requires large investments in faculty, time, money, and space that need to be justified to administrators and leadership [14]. As with other educational materials, there are two major approaches to the evaluation of eLearning called process and outcomes [15].

Evaluating the process examines an eLearning program's strengths and weaknesses and how its results are produced, often providing information that will allow others to replicate it [16]. Peer review is one type of process evaluation. Traditional peer review for journal articles verifies the quality of content. eLearning requires the consideration of additional dimensions [17] [18]. Outcome evaluation of changes in learners' knowledge, skills, or attitudes allows e-learning developers to gauge program effectiveness [19]. Satisfaction measures learners' reactions to the material: was it easy to use, hard to use, fun, boring, and so forth. But satisfaction measures alone do not measure learning.

Developments in eLearning and technologies are creating the groundwork for a revolution in education, allowing learning to be individualized by enhancing learners' interactions with each other with collaborative learning, and transforming the role of the teacher from disseminator to facilitator. Therefore eLearning offers the opportunity for educators to evolve into this new role by providing them with a set of online resources to facilitate the learning process.

VII.   REFERENCES

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