Enhancing the Learning Environment by Identifying the Learner Behavior in an e-Learning System.

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Abstract

E-learning has become an ubiquitous concept in modern education, while e-learning systems provide a rich and flexible learning environment to facilitate the acquisition of knowledge. One missing factor of such systems is the ability of responding to users' emotional state. Building systems with such a capability is a challengeable task. The close interaction that exists within the face-to-face classroom where a facilitator is able to respond to a learner's emotional state, (ex: confusion), is generally absent in e-learning. A major reason why the researchers are facing difficulties in identifying the emotions in eLearning environments is the distance between the learner and the facilitator. The objective of this research study is to analyses the didactical problems of an e learner and the learning environment, and to recognize the learner behavior during the learning session. The results of the empirical study show that there is a close relationship between the learner behavior and their performances of the assessments. The importance of a better feedback system is also recognized as a research finding and the facilitator should have an understanding of the didactical problems of the e-learner during the learning session.

Keywords: e-learning, facilitator, learner, Learner Management System, assessment, learner behavior

1.0 Introduction

The rapid development of Information and Communication Technology (ICT) leads to extremely dynamic changes in various tools and technologies applied to the e-learning process. The most modern scientific researches in the field of ICT are investigating the use of human emotions in computer systems by developing computer models which can recognize and respond to human behavior. E learning has become an ubiquitous concept in modern education system. Resent research in higher education shows there is a grater incensement of e-learning courses compared to conventional educational programmes [1, 2]. E-learning is widely accepted in higher education as a modern learning method which encourages learners to learn by themselves rather learning from facilitators. Unlike in face-to-face teaching and learning, learners can log in to the Learner Management System (LMS) at any time and from anywhere they prefer and actively participate in the activities given in the LMS. The virtual presence of the class room has also led the learner to be interacting with the class mates and facilitators. Enrichment of the learning environment with better collaboration with the facilitator and class mates will lead the learner to learn with satisfaction and enjoyment [3].

Learning patterns have been studied for more than thirty years in Western countries such as UK and USA. Numerous academic research activities have been carried out to monitor the learning pattern of the learner in the face to face environment. For an example, a facilitator can recognize the learner behavior in a face to face class room [4]. However, it is difficult to recognize the learner behavior and their emotions in e-learning environment. The distance between the learner and the facilitator will be the barrios of capturing the learner behavior in an e-learning system.

2.0 Aim of the Research Study

In order to provide a positive response to the learner in an online learning environment there is a need of capturing the learner behavior while they are learning. The purpose of this research study is therefore to analyze the didactical problems of an e learner and the learning environment. Major aim of this research study is to identify the learner behavior in an e-learning environment and thereby to provide necessary feed back on the learner performances.

3.0 Views on the Methods of Learning

The modern education system uses multiple methods and tools to facilitate learning such as electronic learning, mobile learning, problem based learning, project based activities, online discussion groups and chat forums. The rapid development of the information society led to non-reversible processes in teaching where the focus is moved to technology enhanced education.

E-learning is naturally suited for distance learning and flexible learning, but can also be used in conjunction with face to face teaching, where the term blended learning is commonly used [5]. Today, many reputed higher education institutions allow their learners to acquire knowledge and skills in open and distance mode giving the learners flexibility in time, location and pace of their learning [6].

Adult learners especially prefer to have more freedom in learning phase [4]. Even though e-learning environment provide much independence and freedom for the learner, it is difficult to understand the learner behavior during the learning sessions. Daniala and Georgi [7] has identified following didactical problems of the e-learners of higher education.

- No adequate tools available to measure the performance and achievements
- Traditional tutor-controlled systems conducted in most institutions
- Development of e-learning environments with proper pedagogy
- Development of learning content and implementation of e-learning courses
- Poor feedback system to facilitate the learners while learning online

In order to address the aforementioned issues present in e-learning systems learner behavior needs to be evaluated while interacting with an e-learning system. According to Picard [8], it is very important to understand the relationship between computer facilitator and the leaner. However, computer facilitator should not always try to make the user happy or not to make the lesson easier when the learner is unhappy. Therefore in e-learning environment, facilitators should understand learners' psychological status to facilitate their learning without much stress [4]

According to this perspective facilitators should develop the e-learning environment suitable for the different learning styles of the learner. According to Nishino and Ohno [4], the learning styles of the e-learners are falling in to five categories as inherent natures, cognitive structures, personality types, learning preferences and learning approaches

A proper feed back system is a vital task in any learning mode According to Lieb [9], "Positive reinforcement by the instructor can enhance learning, as can proper timing of the instruction". Therefore when giving feedbacks, making questions, grouping teams, preparing assignments, selecting examples, the facilitators should have the ability to enhance the facilitator and learner relationship and to motivate the learner to improve the sills [6,10]. Providing feed back is very much critical in online learning since the facilitator is invisible for the learner. Therefore, the e-learner should be motivated and guided during the online session because [7],

- the learner does not feel real class room environment
- nobody to answer the questions
- less support from the friends/facilitators/instructors
- has to learn by own
- nobody to understand how learners feel and to give encouragement

4.0 Research Hypothesis

The major objective of the research study is to analyse the learner behavior in an e-learning system. In order to achieve the objective of the study, a hypothesis has been made at the beginning stage. Finally, the study will prove on the hypothesis by conducting the statistics analysis. The hypothesis of the study which has been made initially was; the e learner shows a positive behavior, when *the e-learning system is providing the necessary feedback in the activities of the learning session.*

5.0 Methodology of the Research Study

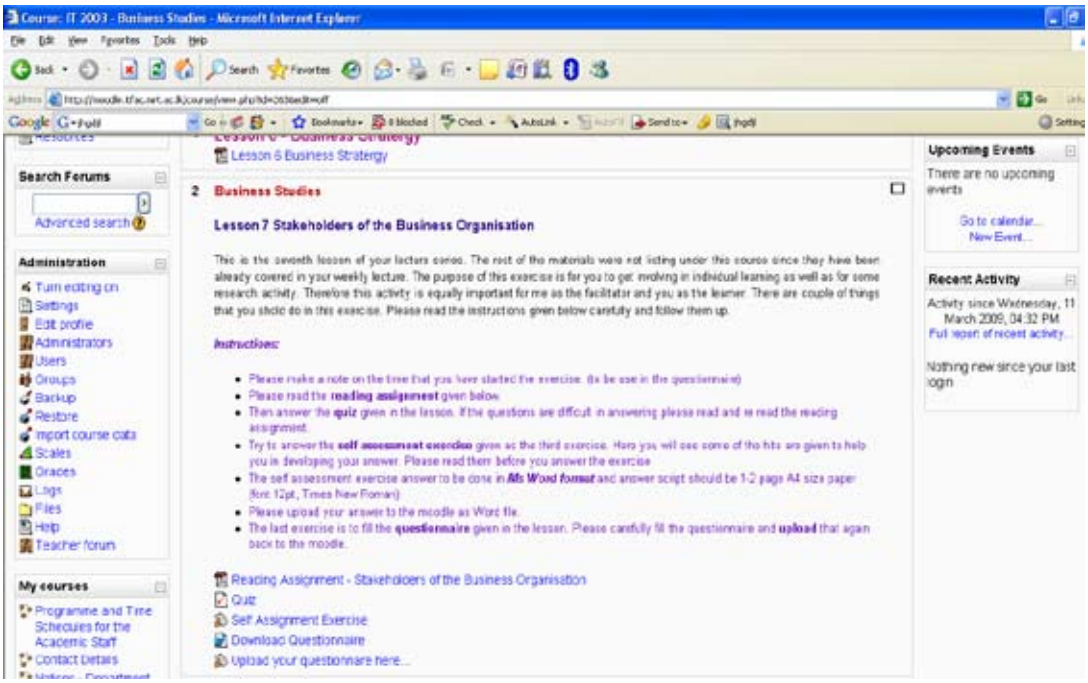
The research study has been carried out with 100 undergraduate learners following an undergraduate degree programme in Information Technology. The course module used in the experiment was the level 2 module, Business Studies. The course module is usually conducted in blended mode with face to face class room sessions and e-learning sessions conducted in the Moodle LMS.

An anonymous questionnaire survey has been conducted in order to get the learner responses. Only 85 learners out of 100 have provided the feed back on the research activity through the questionnaire and rest of the learners have only attempted the activities of the research experiment. Furthermore, the information which is available in the Moodle LMS is used for the data analysis. Figure 1 shows the interface of the LMS which contains the experimental activities.

The experiment was originally planed to be conducted within two weeks but due to the time constraints of the semester system it had to be reduced to one and half weeks. The lesson activity carried multiple tasks as follows;

- Reading Assignment about the Stakeholders of the Business
- Lesson Quiz – Self Assessed
- Assessment Exercise with proper guidelines given by the instructor – reviewed and feedback given by the facilitator.

Figure 1: LMS interface of the Lesson



6.0 Research Findings - Identifying Learner Behavior in an e-Leaning System

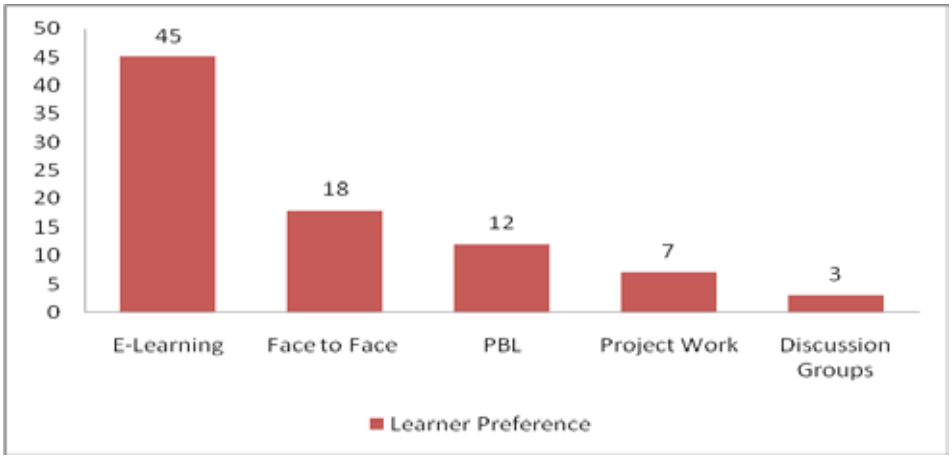
This section of the paper discusses about the major findings of the research study. The statistical analysis has been conducted on the basis of the questionnaire survey. The information which is available on LMS, such as assessment marks and learner feed back were also taken in to consideration on recognising the learner behavior in the e-learning environment.

6.1 Learner Preferences on Different Learning Modes

One of the major findings of the questionnaire survey is the learner preferences on different learning modes. The listed learner preferences in the survey were e-Learning, face to face learning, Problem Based Learning (PBL), proj-

ect work and discussion groups. According to the data analysis, most of the learners prefer e-learning mode rather than face to face sessions. This gives the idea that the adult learning should move form conventional face to face leaning to interactive online web based learning in future and the following Figure 2 shows the graph of the learner preferences.

Figure 2: Learner Preferences on Different Learning Modes



6.2 Location and Time Preference

The next analysis of the research study is to identify the learner preferences on learning time and the place. The questionnaire collected data on the activity plan of the learner of attempting the online session. Following Table 1 shows the learner preferences on different locations and time of attempting the session.

Table 1: Lesson Activity Plan of the Learners

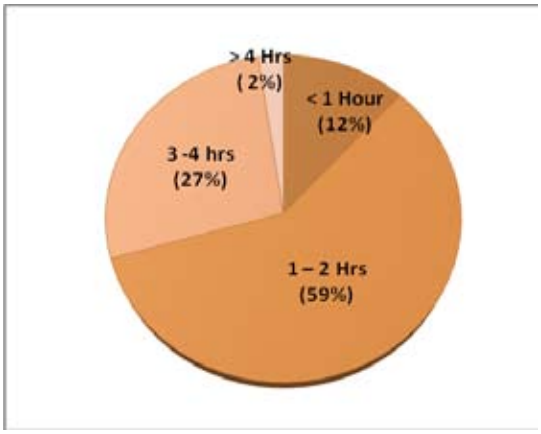
Time of the learner have attempted the exercise.	*Morning*	*Day time*	*Evening*	*Night*
	27	13	15	30
Place of the learner has attempted the exercise.	*University Lab*	*Home/ Boarding place*	*Cyber café*	*Other*
	41	35	7	2

The analysis of the data about the learner preferences on location were categorized into 4 places: university lab, home or boarding place, cyber cafe and other places. Moreover, learners have four time preferences of accessing LMS as, morning, daytime evening and night. Most of the learners who have attempted the research activities at night accessed the LMS from the home or the boarding places. The biggest learner population has attempted the research activity from university laboratories. A learner who have used the university laboratory has commented as; *"It is easy and convenient to access the LMS from the University lab. Also I can finish my work during day time without wasting my leisure time on study stuff."*

The study also shows that learners who have accessed the LMS outside university commented that the speed of the internet connection was much faster than the university lab.
This gives the idea that learners prefer to access the online contents at night and early morning from the outside of the university laboratories.

In the research study, the facilitator of the course module initially planned to conduct the online session within two hours. But the survey shows the difference between the initial plan and the actual time spent on the lesson. As shown in Figure 3 the average time spent on the lesson by the learners vary from one hour to four hours.

Figure 3: Average time spent on the lesson

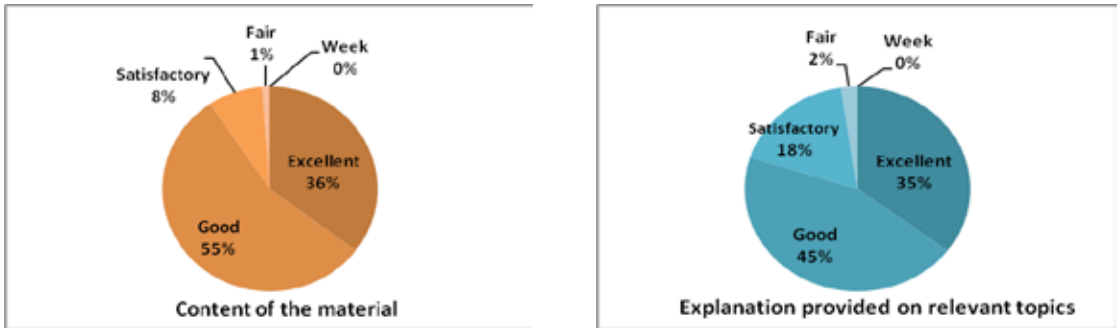


According to Figure 3 many learners have taken time between one to two hours to complete the lesson. Only 4% of learner population has taken more than four hours to finish the exercise. Learners who have taken more than two hours have commented that they could not attempt appropriately due to the ineffective internet connection of the laboratory or the cyber cafe. At the same time, 12% of the learner population has completed the activity within one hour and the results of the assessment exercise were quite good. One learner commented that; *"It is fast and enjoyable. Because it's available at any time and anywhere I wish"*.

6.3 Quality of the Lesson Material

From the viewpoint of the facilitator, the lesson material provided all the necessary guidelines to support the e-learner throughout the online session. The facilitator also thinks that the explanations provided in the lesson material are clear enough and the contents of the material is understandable by the learner and relevant to the topic of the lesson. But we must appreciate the real view of the learner on this regard. It might contrast with what the facilitator may have expected. The experiment survey data shows the real views of the learner on this regard in figure 4.

Figure 4: Learner's views on Lesson Material Provided



One of the learners have commented on the lesson material as; *"When there is an interaction between facilitator and the learners it provides a better understanding of the subject. It is always better hearing and learning rather than reading online stuff"*. This comment implies that some learners prefers face to face sessions and require a higher level of interaction with the facilitator. At the same time many learners have provided a similar commented of: *"In e-learning we are not forced to learn according to a particular time table. I can have learn on my own time. Also when we learn on the Internet we can refer to other relative materials"*. The Figure 4 shows that the positive responses of the learners are fairly higher than the negative responses.

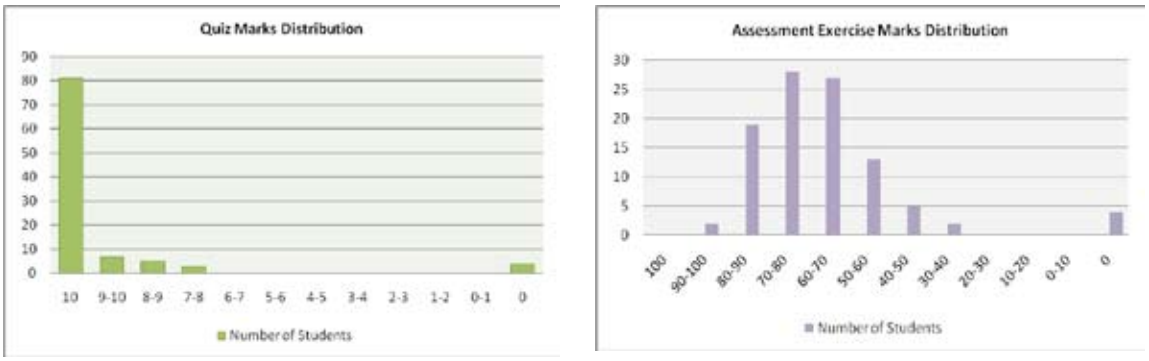
6.4 Learner Behavior in Assessment Techniques

Tognolini [11] stated that "Focus of the assignment can be both the testing of content specific knowledge and the

assessing of generic skills and knowledge". There is therefore a need of conducting suitable learner assessment activities in any online session. The research experiment also carried out two assessment components namely self assessment quiz and assessment exercise. Facilitator provided the necessary feedback of the assessment exercises along with the marks to the learner. Therefore much confirmable environment was created in the Moodle LMS to facilitate the learners to assess their own performances Finally the list of learner grades of the assessment exercise has been displayed in the Moodle LMS for future references.

The self assessment quiz contained multiple choice questions where the learners can carry out a self appraisal. The quiz was setup to allow multiples attempts for the user. Each incorrect answer reduced marks form the total allocated marks and at the end of the quiz showed the total average mark that the learner has scored. Also the grading system allowed the learner to check the average mark of the self assessment quiz. Figure 5 shows the marks distribution of both quiz and self assessment exercises. For the problem of "no adequate tools available to measure the performance and achievements of the learner" of Daniela and Georgi [7] has been addressed in the research study by conducting an online "help wanted help given" session to provide necessary feedback to the learners.

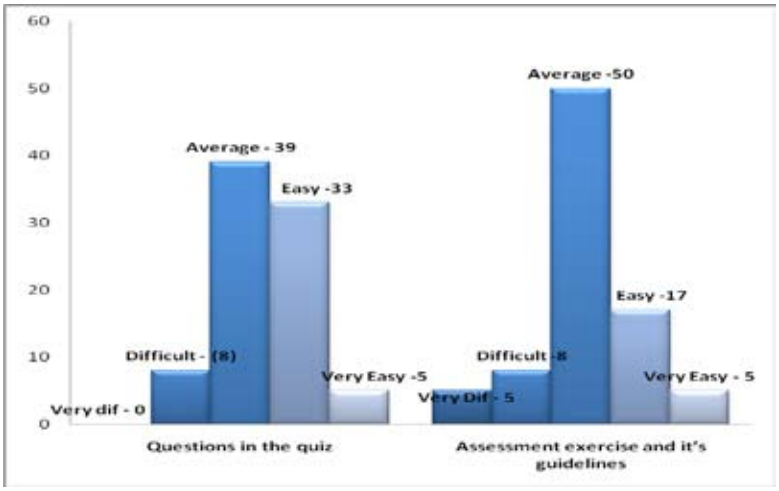
Figure 5: Learners' Marks Distribution



By referring to the above graphs it can be observed that learners have scored good marks for the quiz and assessment. Only four learners have not attempted the exercise mainly due to personal reasons. The average mark of the assessment was 73 out of 100 and the average mark of quiz is 9.3 out of 10. The responses obtained through the questionnaire about the both assessment techniques were analysed and the results shows many of the learners were happy about the method of assessment.

One of the learners' comments on the assessment techniques was; *"It was very interesting and a challenging task. I was able to go through it by myself and also learnt a lot, I really enjoyed the self assessment exercises and the quiz because I can see my achievements quickly"*. At the same time another learner has commented that *"It was a nice attempt to study by myself, but there were certain sections that needed assistance from the facilitator. Had some doubts to be clarified. But overall I felt e-learning was a good method to learn by our self"*. Figure 6 shows the analysis of learner responses on quiz and assessment exercise.

Figure 6: Learner Responses on Assessment Techniques

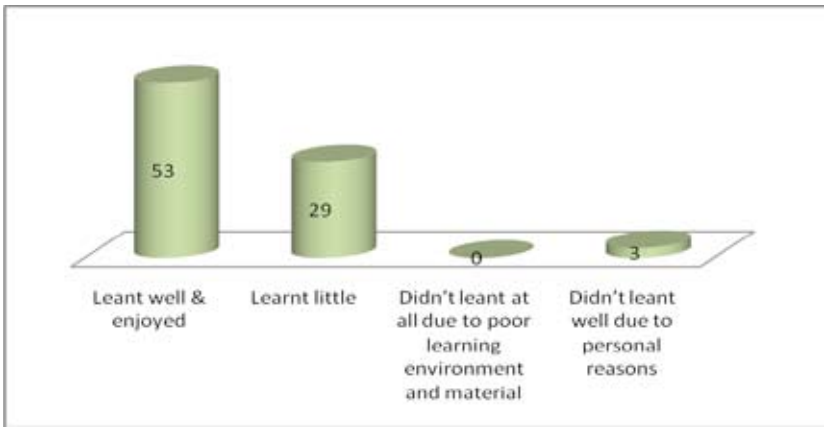


6.5 Overall Evaluation of the Learners

According the above statistics of the e-learning activities, the study can predict on how the learner perform in the e-learning system. The hypothesis of the study given in the beginning says that there is a direct impact of feedback system to the learner performances. The results of this empirical study show that the learners are showing satisfactory performances on the assessment techniques. At the same time learners have different preferences on different activities which are also having a direct impact on the learner performances. Therefore, in order to recognize learner behavior in an e-learning environment it must be acknowledge the overall evaluation of the learners on the research activity given in the questionnaire survey.

Figure 6 shows the statistical analysis of the overall evaluation of the learners. No one has commented that the learning environment was poor and the quality of the material is not good. Only three learners have commented that they couldn't learn well due to the personal problems of attending in LMS on time. Majority has commented that the activity was well enjoyed. One learner has commented as: *yes it is easier than the learning in the lecture room. Through the E-Learning mode we can learn any place at any time. Therefore we like online learning much. But we have not seen the fullest participation of the entire batch of learners in the e-learning session"*. According to this learners comment it implies that some of the learners in the batch have missed out the session.

Figure 7: Overall Evaluation Summary of the learners



The final objective of the research is to prove on the hypothesis that the study has been made at the beginning. The statistical analysis is shows that the well maintained feedback system enhance the learner performances. The re-

search findings given in the section 6.1 – 6.4 shows that learners encourage by receiving a positive feedback on the performances and the facilitator should motivate the learners to achieve the necessary targets. Finally, the learners should have to have the freedom of selecting on the mode of learning and the facilitators should priorities the learner preferences in order to enhance the learning activities.

7.0 Conclusion

This research study has been carried out to identify the learner behavior in the e-learning session in order to create an effective learning environment. The results of the study show that the enrichment of the learning environment by adopting the system according to learner emotions improves the collaboration with the facilitator and peers. Results also indicate that the learning location and the learning time have an indirect impact on the learner motivation towards better performances. Moreover, the results suggest that the learning environment and the learning material have to be pedagogically reviewed and be more interactively facilitated in responding to learner behavior. The next step of this empirical study would be to identify the necessary features of the e-learning environment that can assist the learner by removing the problems identified in the experiment. The need of providing necessary feed back in every assessment activity is a must in e-learning because the learner needs high motivation during the online session. Further more, the study also shows that it is important to keep the learners' attention thorough out the online session.

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