

# Learning Management System (LMS) as Support Mechanism for Improving Quality Education

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**Abstract-** Technology has affected every facet of life and changed complete scenario of human activities all over the globe. Education is no exception. Technological advancement has also changed the complete overview of educational activities at all levels including university level education. Since last two decades, even in third world countries with meager resources, there has been boom in education industry after merger of communication and computer technologies. A number of technology based solutions have been introduced either using technology as training aid or as facilitator to impart cognitive learning to students. The latest is the introduction of E-Learning and Learning Management System (LMS) which has revolutionized the whole educational infrastructure of most of the universities of the world. A very cost effective online web based solution may provide excellent facilities to faculty as well as students to get maximum knowledge in minimum time at their door step 24/7 within no time. In this study, we have discussed main features required for a good and productive LMS an offshoot of e-learning, and proved through analysis on the basis of data collected from both faculty and students of National University of Sciences and Technology Pakistan (NUST) Pakistan, to test the hypothesis that E- Learning is highly effective in improving student-teacher interaction, quality of instruction, resource sharing, organization of various activities and assessment of students as compared to conventional learning techniques. We have also discussed how Computer Based (CB) exam system can improve the quality of learning while testing knowledge base of students using conceptual learning techniques.

**Index Terms-** Communication and Computer Technology, E-Learning, Learning Management System (LMS), National University of Sciences and Technology (NUST) Pakistan, Computer Based (CB), Conceptual Learning

## I. INTRODUCTION

Technology in last few decades has changed all facets of human endeavors including the field of education. The academia in world over has introduced technological advancement to improve overall learning environment [13]. In developing countries like Pakistan, Higher Education Commission (HEC) has taken number of initiatives to support technology supported learning environment

and research activities in universities of the country. It includes connectivity of all public sector universities of the country through Pakistan Education Research Network (PERN), access to free licensed software to faculty and students through Microsoft Academic Alliance, Video conference facilities for interaction with national and international academic elite and number of other projects. This has improved international ranking of institutions affiliated with HEC through effective use of Learning Management System [1][2]. National University of Sciences and Technology (NUST) of Pakistan, a degree awarding institution recognized by HEC, has also introduced e-learning environment. All constituent colleges of NUST have also introduced Learning Management System (LMS) for its students. As students in these institutions come from different segments of society with varied academic experiences, LMS is designed in a way to give them building block to cope up their future professional requirements and subsequently improve their knowledge in various pursuits of life. In this paper, analysis of effective use of LMS and online exam system in one of NUST institution, as a support mechanism to improve quality of teaching learning environment, has been carried out. Paper is divided in four sections and will discuss the efficacy of use of LMS by faculty and students at university level education. The first section of the paper includes introduction, second section will discuss the importance of e-learning technology and basic features of a good LMS, third section will cover material and method of research along with analysis of study and last section concludes the paper with discussions and recommendations for future research.

## II. MAIN FEATURES OF A GOOD LMS INCLUDE [8]

- 1) A systematic and productive learning environment for faculty and students is the foremost requirement to make a LMS success. This includes networking, technical equipment like computers, multimedia projector, LCDs, laptops and alternative power resources.
- 2) A good learning system will provide self-paced and flexible environment in which all resources are available 24 / 7 on and off line at doorstep of students.
- 3) Release of pressure points of students through flexible self-paced time management.

- 4) Use of collaborative modern teaching methodology and multimedia to redefine role of faculty in and off the class room activities.
- 5) Saving of physical resources and man hours.
- 6) Conduct of online exam saving time and resources with availability of results in real time.
- 7) Improvement of contents delivery and subject material.

### III. OBJECTIVES OF STUDY

Following objectives have been set for this study:

- a. To highlight main features of a good LMS at university level education.
- b. To prove through evidence based research that e-learning with LMS approach is extremely productive as compared to traditional education system.
- c. To analysis the conduct and effectiveness of Computer Based (CB) online exam system as compared to traditional paper based exam.
- d. To conclude and give recommendations for implementation of LMS at university.

### IV. HYPOTHESIS OF STUDY

The hypothesis set for study is that E-learning using LMS does not improve the learning environment at university level due to lack of adoption to change in mindset to shift from face to face traditional learning to technology based electronic learning. The hypothesis is based on the resistance to technology due to its unknown fear to both students and faculty and diversified academic background of students.

### V. FACTORS TO BE ANALYZED

Following factors will be analyzed on the basis of hypothesis designed for the study.

- a. E-Learning helps to cross the mental barrier of use of technology both for faculty and students.
- b. E- Learning through use of vibrant LMS will improve the overall system of an institution.
- c. Use of technology will improve the performance of faculty and students through extensive use of LMS.

### VI. MATERIAL AND METHOD

The analysis of the study is conducted on the basis of quantitative research in which data collected from two groups including young / senior faculty with minimum qualification of post graduate degree and university level students through a well-designed questionnaire. The data was collected online through LMS software from a sample of randomly selected 192 respondents out of which 86 were the faculty members and 106 were students. Each factor to be analyzed was further divided into sub factors to get the pragmatic results on problem under discussion in this study. The first factor i.e. e-learning helps to cross mental barrier of use of technology has been divided into five sub factors, second factor i.e e-learning through use of vibrant LMS will improve the overall system of an institution, has been divided into seven

factors, whereas third factor i.e use of technology will improve the performance of faculty and students through extensive use of LMS, has been dilated into further six sub factors. The detail of respondents is in table 1. A statistical software package for Social Sciences SPSS is selected to calculate various statistics. A statistical analysis has been carried out to study paradigm shift from traditional to technology based learning.

**Table 1:** Category wise sample of study.

Category	Number of Respondents
Senior/Junior Faculty	86
Students	106
Total	192

The questionnaire was designed using the most common five point likert-scale, assessing the intensity of agreement or disagreement of respondents to a particular statement through strongly disagree to strongly agree attributes.

### VII. RESULTS AND DISCUSSION

Data in the questionnaire are discussed on the basis of three factors further divided into subgroups of statements. The results and analysis are presented for two categories including faculty and students.

**Table 2 (Faculty):** E-Learning helps to cross the mental barrier of use of technology both for faculty and students.

Statement	1		2		3		4		5	
	Strongly Disagree		Disagree		Partially Disagree		Agree		Strongly Agree	
	No	%	No	%	No	%	No	%	No	%
1			6	14	4	5	20	23	56	65
2	2	2	10	12	2	2	42	49	30	35
3			2	2	4	5	32	37	48	56
4			4	5	10	12	48	56	24	28
5			4	5	6	7	40	47	36	42

In Table 2 and Table 2A, an extremely high percentage of both faculty and students (88% for faculty and 95% for students) agreed that e-learning will help to cross the mental barrier to use technology in learning. There is weak correlation observed between faculty and students (Fig 1) on this factor mainly because of greater exposure of students towards technology from the very beginning of their studies [12]. Both faculty and students unanimously agreed (faculty 84 % and students 85 %) to the fact that different academic back ground of the students is the main reason for avoidance to adopt e-learning and simulation training. Maximum members of faculty and students are agreed that facilities and environment is conducive for implementation of e-learning. There is strong positive correlation shown by faculty and students on rest of the four factors (Table 2B). The hypothesis tested on the basis of higher order partial correlation coefficients at 5% level of significance using Fisher Z- test statistic for various factors has also been accepted which supported our hypothesis that

technology based learning helps both faculty and students to cross the mental barrier (Table 2B).

**Table 2A** (Students): E-Learning helps to cross the mental barrier of use of technology both for faculty and students.

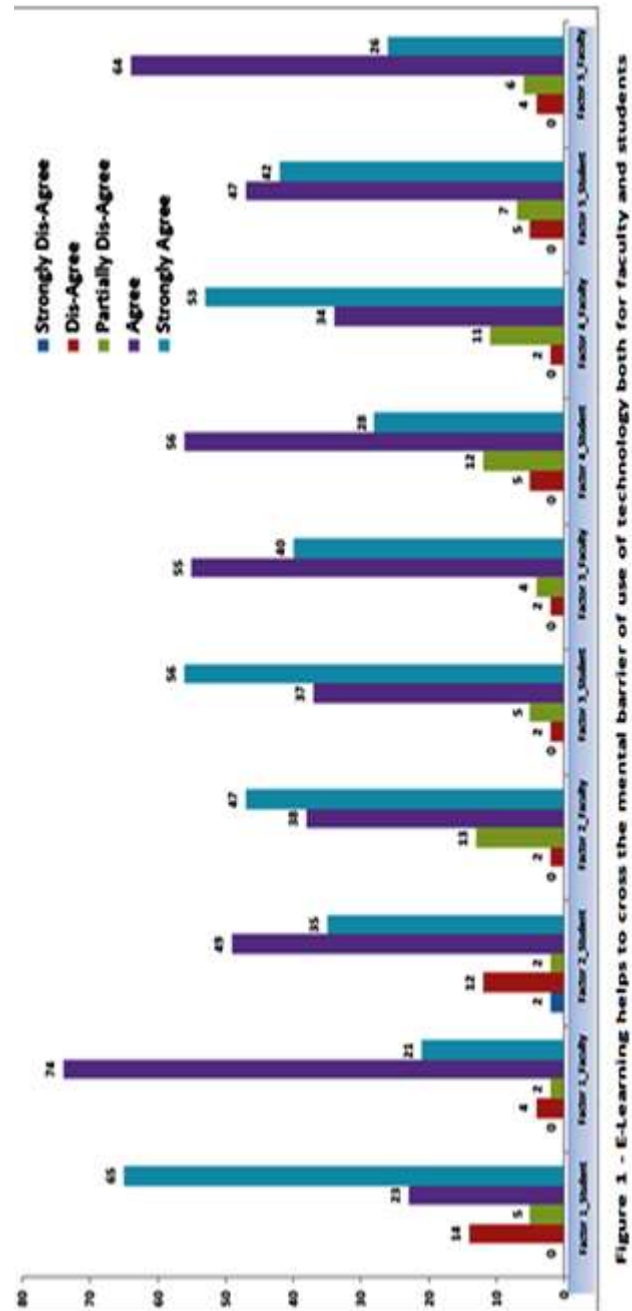
State ments	1		2		3		4		5	
	Strongly Disagree		Disagree		Partially Disagree		Agree		Strongly Agree	
	No	%	No	%	No	%	No	%	No	%
1			4	4	2	2	78	74	22	21
2			2	2	14	13	40	38	50	47
3			2	2	4	4	68	55	42	40
4			2	2	12	11	36	34	56	53
5			4	4	6	6	68	64	28	26

Statements (col1 of table 2 and 2A)

- 1-E-Learning helps to cross mental barrier
- 2- Academic back ground is main reason to avoid e-learning / simulation training.
- 3- Availability of latest technologies will improve the learning environment.
- 4- Available facilities of e-learning are satisfactory.
- 5- I find environment conducive for implementation of e-learning.

**Table 2B:** Matrix of correlation for factor 1 (faculty & students)

Category	Student Factor				
Factor Faculty	1	2	3	4	5
1 Pearson Cor.	.300	.850	.662	.916	.402
Sig. (2-tailed)	.623	.068	.223	.029	.502
2 Pearson Cor.	.909	.864	.979	.813	.940
Sig. (2-tailed)	.032	.059	.004	.094	.018
3 Pearson Cor.	.608	.980	.887	.993	.696
Sig. (2-tailed)	.276	.004	.045	.001	.192
4 Pearson Cor.	.968	.822	.960	.730	.991
Sig. (2-tailed)	.007	.088	.010	.162	.001
5 Pearson Cor.	.842	.962	.990	.923	.900
Sig. (2-tailed)	.074	.009	.001	.025	.038



**Fig.1**

Statements for table 3 and 3A

- 1- E- Learning bring pedagogical shift from traditional to electronic learning
- 2- Learning Management System save time and resources
- 3- Online computer based exam improves the quality of exam system
- 4- online line exam save time and man-hours
- 5- Online exam should be hybrid using MCQ/ Subjective exam
- 6- Did you agree that 100% exam should be computer based
- 7- Will Learning Management System be cost effective and practicable

**Table 3 (Faculty):** E- Learning through use of vibrant LMS will improve the overall system of an organization

State ments	1		2		3		4		5	
	Strongly Disagree		Disagree		Partially Disagree		Agree		Strongly Agree	
	No	%	No	%	No	%	No	%	No	%
1			4	5	2	2	44	51	36	42
2					6	7	34	40	46	53
3					22	26	38	44	26	30
4					12	14	32	37	42	49
5			8	9	2	2	44	51	32	37
6	2	2	10	12	10	12	36	42	28	33
7			2	2	6	7	52	60	26	30

**Table 3A (Student):** E- Learning through use of vibrant LMS will improve the overall system of an organization.

State ments	1		2		3		4		5	
	Strongly Disagree		Disagree		Partially Disagree		Agree		Strongly Agree	
	NO	%	NO	%	No	%	No	%	No	%
1			2	2	6	6	40	38	58	55
2					6	6	64	60	36	34
3			4	4	12	11	30	28	60	57
4					14	13	50	47	42	40
5	2	2	2	2	16	15	42	40	44	42
6	2	2	8	8	10	9	42	40	44	42
7			2	2	14	13	46	43	44	42

In this section (Table 3 and Table 3A), the second factor i.e. e-learning through use of good LMS improves the overall performance of an institutions, has been analyzed through seven sub factors. The first sub factor was extensively supported by both faculty and students who agreed that e-learning would bring pedagogical shift from traditional to electronic learning (faculty 93%, students 93%). This result showed close agreement between faculty and students on importance of e-learning for future improvements in any educational system [3][7]. There was also

consensus between faculty and students that LMS would save time and resources and more than 90% of them showed their agreement on it. For next two factors above 85% faculty and students agreed that computer based (CB) exam would improve the quality of exam system and bring paradigm shift from understanding base exam to conceptual base exam. This will encourage the students to think and answer instead of memorize and answer.

**TABLE 3B: MATRIX OF CORRELATION FOR FACTOR 2 FOR FACULTY AND STUDENTS.**

Categories	Student Factors						
Factors	1	2	3	4	5	6	7
<b>Faculty</b>							
1 Pearson Cor.	.926	.967**	.818	.966**	.945**	.981**	.964**
Sig.	.024	.007	.091	.007	.015	.003	.008
2 Pearson Cor.	.997**	.857	.960**	.948*	.977**	.982**	.972**
Sig.	.000	.064	.009	.014	.004	.003	.006
3 Pearson Cor.	.755	.884*	.678	.929*	.906*	.827	.907*
Sig.	.140	.047	.208	.023	.034	.084	.034
4 Pearson Cor.	.983**	.841	.960**	.954	.988**	.966**	.977**
Sig.	.003	.074	.010	.012	.002	.007	.004
5 Pearson Cor.	.881*	.972**	.757	.945*	.909	.959**	.936*
Sig.	.048	.006	.138	.015	.032	.010	.019
6 Pearson Cor.	.888*	.965**	.786	.967**	.941*	.967**	.962**
Sig.	.044	.008	.115	.007	.017	.007	.009
7 Pearson Cor.	.781	.997**	.630	.941*	.881*	.890*	.908*
Sig.	.119	.000	.254	.017	.049	.043	.033

They also showed strong agreement that CB exam will save precious man hours also. In the next two factors, 88% faculty agreed that hybrid exam system a combination of objective and subjective exam would be more appropriate whereas 75% of faculty gave their consent that it should be purely computer based exam and 12% partially agreed to it with almost 12% disagreed and gave the opinion that there should be portion of exam which should be conducted manually. In contrast to it, 82% students agreed that it should be hybrid exam system and should be CB and almost 10% showed their disagreement to this. The last factor in this item was either LMS be cost effective or not in which 90% of faculty and 85% of students showed their agreement that it would be very cost effective and practicable.

This factor shows extremely strong correlation for all seven sub factors and strong agreement between faculty and students that e-

learning through LMS would definitely improve the performance of an organization (Fig 2). The hypothesis tested on the basis of partial correlation coefficients at 5% level of significance using Z-test statistic for various factors has been accepted which supported our hypothesis that LMS will improve the overall performance of an organization (Table 3B).

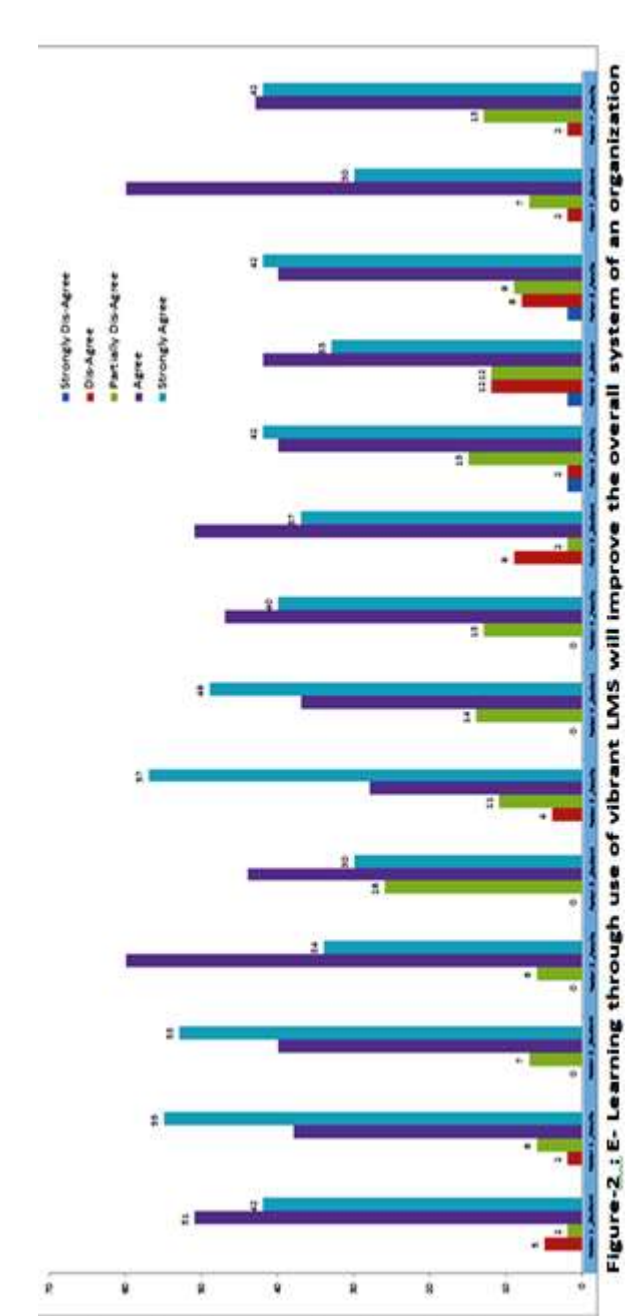


Fig.2

Statements for Table 4 and 4A

- 1. E- learning be used in support of face to face interaction of Instructor
- 2. E-learning contribute for progressive development of students in their future professional tasks

- 3. Technology improve the interest/ participation of students in class room activities
- 4. E-learning improve the quality of instruction
- 5. E-learning help the faculty to teach the class
- 6. E-learning help to provide focused and directed knowledge to students

Table 4. (Faculty): Use of technology will improve the performance of faculty and students through extensive use of LMS

Statements	1		2		3		4		5	
	Strongly Disagree		Disagree		Partially Disagree		Agree		Strongly Agree	
	No	%	No	%	No	%	No	%	No	%
1			2	2	2	2	56	65	26	30
2			2	2	8	9	44	51	32	37
3					4	5	38	44	44	51
4			2	2	4	5	48	56	32	37
5			4	5	4	5	58	67	20	23
6					4	5	44	51	38	44

In Table 4 and 4A, the analysis of first item of last factor revealed that majority of the faculty (95%) gave their agreement to use of e-learning in support of routine face to face teaching to students where as 75% of student supported it, out of which only 15% strongly agreed to it which showed their tilt towards use of LMS more extensively in class room activities. However, a small percentage of students (4%) did not agree that technology could be used in support of face to face learning. The 88% of faculty and 95% of students agreed that knowledge attained by students through e-learning would help students in their further career progression. There was a strong agreement between students and faculty that use of LMS would improve the interest of students in class room activities and more than 90% of both felt that students would be more alert and inquisitive while learning in the class rooms. Both the faculty and students also had strong agreement that instructional ability would improve by using facilities available in LMS like use of power point presentations including relevant video clips, online submission and marking of assignments, availability of lesson plans and lectures 24/7 to students, use of anti -plagiarism software both by students and faculty and conduct of at the spot online CB quiz tests and exams.

This study has also showed that more than 90% of faculty and students agreed that e-learning would help to provide focused and essential knowledge to students as they will be given the material



to study in the form of lectures, slides, directed references of study to save time and resources in searching relevant stuff. The hypothesis tested on the basis of partial correlation coefficients at 5% level of significance using Z-test for various sub factors has also been accepted which concludes that use of technology will improve the performance of both faculty and students (Table 4B).

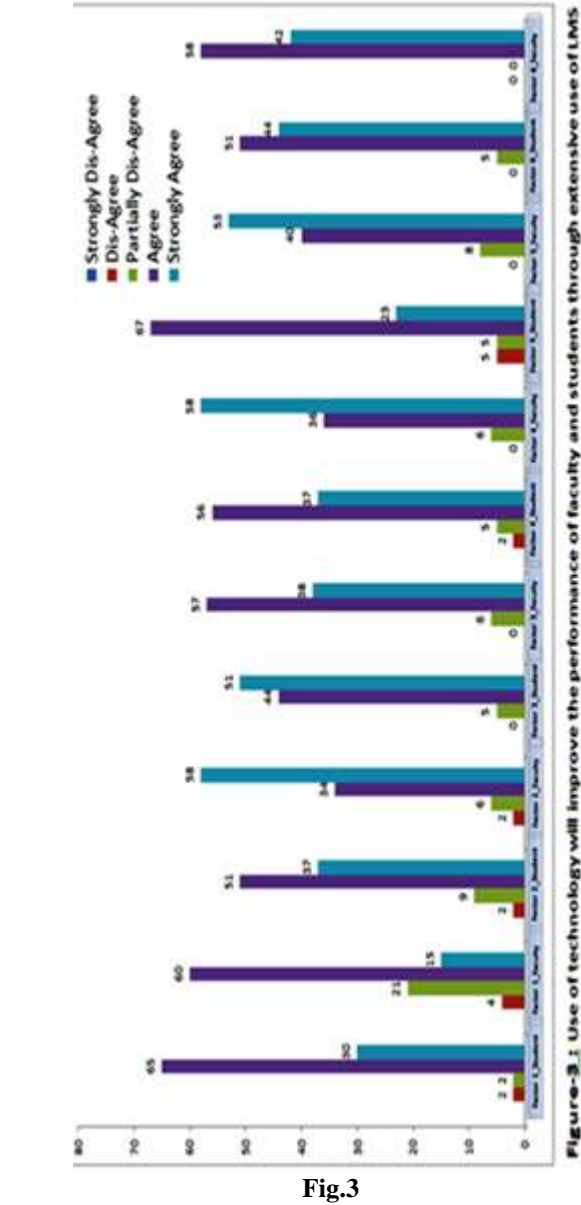


Fig.3

Table 4A (Students): Use of technology will improve the performance of faculty and students through extensive use of LMS

State ments	1		2		3		4		5	
	No	%	No	%	No	%	No	%	No	%
1			4	4	22	21	64	60	16	15
2			2	2	6	6	36	34	62	58
3					6	6	60	57	40	38
4					6	6	38	36	62	58
5					8	8	42	40	56	53
6							62	58	44	42

TABLE 4B: MATRIX OF CORRELATION FOR FACTOR 1 FOR FACULTY AND STUDENTS.

Category	Student					
Faculty Factors	1	2	3	4	5	6
1 Pearson Cor.	.899 <sup>*</sup>	.697	.978 <sup>**</sup>	.722	.794	.968 <sup>**</sup>
Sig.	.038	.191	.004	.168	.109	.007
2 Pearson Cor.	.838	.846 <sup>*</sup>	.997 <sup>**</sup>	.865	.918 <sup>*</sup>	.989 <sup>**</sup>
Sig.	.076	.071	.000	.058	.028	.001
3 Pearson Cor.	.624	.970 <sup>**</sup>	.936 <sup>*</sup>	.979 <sup>**</sup>	.995 <sup>**</sup>	.952 <sup>*</sup>
Sig.	.260	.006	.019	.004	.000	.013
4 Pearson Cor.	.843	.818	.999 <sup>**</sup>	.839 <sup>*</sup>	.895 <sup>*</sup>	.995 <sup>**</sup>
Sig.	.073	.090	.000	.076	.040	.000
5 Pearson Correlation	.941 <sup>*</sup>	.589	.941 <sup>*</sup>	.618	.702 <sup>*</sup>	.921 <sup>*</sup>
Sig. (2-tailed)	.017	.296	.017	.267	.186	.027
6 Pearson Correlation	.755	.904 <sup>*</sup>	.986 <sup>**</sup>	.920 <sup>*</sup>	.958 <sup>*</sup>	.991 <sup>**</sup>
Sig. (2-tailed)	.140	.035	.002	.027	.010	.001

IX. DISCUSSION AND RECOMMENDATIONS

The results presented in the study rejected our hypothesis and accepted its alternative that e-learning and use of LMS will improve the learning environment at university level. Both faculty and students strongly agreed that technology is no more barriers to change the mindset even in third world countries like Pakistan. They agreed that constructive approach encouraging technology equipped class room learning environment will improve quality of knowledge instead of traditional teaching. They also strongly agreed that students will get more space and time to learn with availability of resources 24/7 at their door step. The students will have more interest in class room activities and will learn difficult concepts very easily using multimedia and video clips. Both faculty and students strongly agreed that online exam will provide conceptual knowledge along with availability of results, monitoring of exams and evaluation of performance in real time. On the basis of results of this study, we conclude that technology base learning environment has brought paradigm shift from traditional to e-learning and put forth few recommendations for future improvement and study.

- a. The teacher of 21st century should transform himself with more exposure to technology from traditional teaching approach to e-learning approach to bridge the gap of technology quickly between teachers and knowledge driven students.
- b. The proper infrastructure should be provided for better implementation of e-learning project at university level and all resources should be available 24/7 at door step of faculty and students.
- c. The curriculum should be transformed from traditional stereo type teaching to e-learning mechanism to improve academic performance of students and quality of instruction in class room.

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