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Technology Adoption and E- Learning in Higher Education: An Analysis by using Meta Analyses

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Technology Adoption and E- Learning in Higher Education: An Analysis by using Meta Analyses

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Abstract- The increase use of new technology has made a huge change in higher education. Use of new electronic tools as computer, internet, audio, video conferences likewise which are helpful in learning higher education. This study aims to analyze the attitude of students, teachers and administrators towards technology adoption and e learning in higher education. To accomplish the objective, it examines the ten previous research studies based on the e learning and new technology adoption in higher education. In this study, meta analyses has used as a statistical tool to analyze the study and recorded that the acceptance of the null hypothesis. This study found that the students, teachers and administrators are positively accepted the technology adoption and e learning in higher education. The teachers and students has increased their use of new technology while delivering their lectures, make their assignments, presenting their views in seminars, conferences and workshops.

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I. Introduction

In a new paradigm the technology innovation has played a vital role in day to day activities. This technology advancement also spread their steps in academics and students life for learning their concepts in higher eduaction. Various e learning options are available in academics as computers, internet, audio-visual conferencing, projectors, chat rooms, bulletin boards and e mails which are helpful to connect with the staff members and students. The internet provides the all resources to students and teachers for learning and research. All these resources are used for e learning in campuses. The adoption of e learning technology transforms the people and their performance levels, provide up-to-date knowledge and improve their skills.

Chen (2012) described the e learning to such names as online learning, distance learning, virtual learning, computer based training and internet sessions which supported learning and teaching in classrooms. The e learning method requires little time from people. There is no need to contact face to face with their teachers to solve their problems. It is very cost effective technique via adoption of technology for teachers and students. It enables the faculty members and students to communicate at the same topic in both asynchronous and synchronous formats. In fact, most of the tasks has been done easily between them by adopt e learning technology.

The e learning education access better and understanding information to students, provide multiple options to learn or understand, provide various instruction for easy learning and improves satisfaction levels while studying. The success of e learning technology in higher education depends on the various factors as technology availability, perception and beliefs, students and teachers adoption of e learning technology, training sessions and attitude towards e learning technology. If the attitude, perception, behavior and beliefs of teachers and students is positive then adopted e learning technology soon and is negative behavior recorded then they stay away from the e learning technology.

The staff members sometimes unfamiliar with the new technology and stay away their selves from technology adoption. Various studies have recorded that the less use of e learning technology in premises due to the lack of training staff, lack of management support, high technology cost, comfort level and absence of equipments. These problems have to solve by the top level managers to increase the adoption of e learning technology in higher education.

II. Review of Literature

Al-alak and Alnawas (2011) investigated the teacher's behavior towards e learning concept adoption. The 5 point likert-scale data was collected from the Jordanian university experts and administrators. And found positive association between intention to adopt e learning technology and use of new technology in university department by teachers. The experts need computer knowledge to use new technology and found computer anxiety. The lecturers found management support to implement and adopt the e learning technology. Al-adwan and Smedley (2012) analyzed the full time staff and student's towards technology adoption and e- learning behavior in Jordon universities. In this study also examined the parameters which affect the students and staff members while e learning and new technology adoption as infrastructure and cultural influence. To evaluate the behavior of teachers and students, questionnaires were distributed on ICT skills, interests of respondents in e learning and their attitude towards e learning and new technology. It found that the majority of respondents did not work independently and

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need face to face lectures from their teachers for more learning.

Chen et al. (2012) described the adoption of e learning concept by expectancy theory in which students were motivated to adopt new e learning technology. The multiple regression analysis used to identify the students responses towards adoption of e learning technology. And found the behavior of students that they were highly motivated to succeed technology adoption. It concluded the positive correlation among use of e learning technology and the performance of students during course work with the use of new technology. Neyeloff et al. (2012) described the statistical tool meta analyses and its calculations step by step by using Microsoft excel spreadsheet. Chokri (2012) analyzed the technology adoption online education in university premises. The data was collected from the students and concluded that the use of e learning technology is familiar for them. There is negative behavior recorded in the use of ICT learning technology. Many students were high experienced in using the computer for e learning and others needed assistance. But the visual learning resources were accepted by students in e learning process.

Alkharang and Ghinea (2013) studied the barriers which affect the e-learning in higher education. The qualitative research was used and data collected from the academics and managers from the educational institutes through interview method. It analyzed that majority of respondents responded that there were lack of support, lack of management, language problem and technology speed problems in adoption of e learning in educational institutes. Kosgei (2015) investigated the ICT infrastructure indices and technical indices which influenced the qualified personnels to adopt new learning technology. It found that many of the respondents adopt internet learning technology in campuses. Because respondents found more power, internet connectivity, computers, teachers and technical support in campuses environment.

Maina and Nzuki (2015) explained the problems or factors which influence the organizations to adopt e learning management system. This study recorded the majority of responses uses less e learning technology. But they were influenced from e learning technology adoption by better performance outcomes. With the use of internet and e technology was accomplished the task more easily. It helped the students to get more information from internet, connect with the friends, accomplish the assignments, connect with the teachers and also get solutions timely.

III. Objective and Research Methodology

This paper focuses on to examine the attitude towards technology adoption and e learning in higher education from students, teachers and administrators. Keeping this into consideration, it is hypothesized as:

H_0: Positive attitude towards technology adoption and e-learning in higher education.

This study is based on the empirical results which are taken from the previous exploratory and conclusive research studies. In this study, the 10 independent previous research studies have been scrutinized through google brower during study period July 2010 to October 2015. These studies are collected primary data from students, faculty members and administrators of the colleges. This study considers the sample size to as total number of questionnaires distributed and number of questionnaires returned from the students, staff members and administrators in previous research studies. And the sample size is tested by using the meta analyses as a statistical tool. The meta analyses refers to the statistical tools which combined the results of two or more number of independent research studies.

a) Calculation of chi square statistics (q)

Jindal and Chander (2015) described in study the calculation of Q. The symbol Q represents the chi square statistics and symbol k denotes total number of studies. The degree of freedom is measured by differentiating one with the total number of studies. But in this research paper, the total number of studies is 10 and degree of freedom is 9. The null hypothesis has been evaluated against calculated value of chi square (Q). The null hypothesis is formulated as positive attitude towards technology adoption and e- learning in higher education. If the calculated value of Q is more than the tabulated value of chi square then the null hypothesis is rejected and if the tabulated value is less than the calculated value of chi square in this study then, the null hypothesis is accepted. The tabulated value of chi square in this study is 16.919 by using degree of freedom. The formula of Q has been given below as:

$$Q = \sum(w * es^2) - \frac{[\sum(w*es)]^2}{\sum w}$$

Whereas,

Q = chi square,
es = outcome or effect size of the study,
w = weights of the study and
$w\,es^2$ = squaring the weighted effect size of the studies.

Through the use of fixed effect model in this study, the chi square value is recorded as 708.63 and the null hypothesis is rejected. And the value of Q is recorded 2.92 with the use of variability random effect model which is less than the tabulated value of chi square and accepted the null hypothesis. The acceptance of null hypothesis is considered as the positive attitude of teachers, students and

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administrators towards e learning and technology adoption in departments. In this case heterogeneity of the study is tested with the help of I^2.

The below meta analyses figure is showing the calculation of chi square with the help of both models as fixed effect model and random effect model. These models provide the clear view of the study acceptance and rejection level.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1		Theoretical study: Meta analysis of 10 cross sectional studies.													
2	Author Name and Year	Events	Total sampl	Mean (es)	Standard Error (SE)	Variance	Weights	w*es	$w^*(es^2)$	w^2		W_v	W_v*es	W_v*(es^2)	W_v^2
3	Kundi et al. 2010	354	388	0.91237113	0.048491979	0.00235147	425.2655367	388	354	180850.7767		6.79478705	6.199367567	5.656124018	46.16913107
4	Al- alak and Alnawas 2011	832	1000	0.832	0.02884441	0.000832	1201.923077	1000	832	1444619.083		6.8656716	5.712238771	4.752582657	47.13744651
5	Chokri 2012	151	151	1	0.081378846	0.00662252	151	151	151	22801		6.60315787	6.603157874	6.603157874	43.60169391
6	Jan et al. 2012	159	200	0.795	0.063047601	0.003975	251.572327	200	159	63288.63573		6.72064804	5.342915192	4.247617578	45.16711008
7	Chen et al. 2012	169	173	0.97687861	0.075144509	0.0056467	177.0946746	173	169	31362.52376		6.64598118	6.492316879	6.342205506	44.16906589
8	Al- adwan and Smedley 201	79	100	0.79	0.088881944	0.0079	126.5822785	100	79	16023.07323		6.54792336	5.172859454	4.086558968	42.87530031
9	Alkharang and Ghinea 2013	15	15	1	0.25819889	0.06666667	15	15	15	225		4.72842657	4.728426568	4.728426568	22.35801781
10	Mbengo 2014	278	1025	0.27121951	0.016266665	0.0002646	3779.226619	1025	278	14282553.84		6.89252178	1.869386394	0.507014066	47.50685643
11	Maina and Nzuki 2015	600	600	1	0.040824829	0.00166667	600	600	600	360000		6.82655172	6.826551723	6.826551723	46.60180842
12	Kosgei 2015	351	385	0.91168831	0.048662322	0.00236802	422.2934473	385	351	178331.7556		6.79402306	6.19403141	5.647026039	46.1587493
13															
14	k	10				Sums:	7149.95796	4037	2988	16580055.68		65.4196922	55.14125183	49.397265	431.7451797
15	df	9													
16												v	0.144820175		
17	Q (chi square)	708.63429			Q_v	2.9195524									
18	I^2	98.729951			I^2_v	-208.266431									
19															
20	es (fixed)	0.5646187			es (random)	0.84288461									
21	SEes (fixed)	0.0118263			SEes (random)	0.12363623									

Figure 1: Combined view of 10 previous research studies in which Chi square calculated by using fixed and random effect model through Meta analyses

b) Calculation of I^2

This I^2 is used to quantify the heterogeneity between different independent studies in this study through meta analyses. If the heterogeneity of the study found low then, the fixed effect model has been used. But if the heterogeneity of the study is very high then, the random effect model is used to reduce the variability between the studies. The formula of I^2 is shown below.

$$I^2 = (Q - df)\ Q*100$$

Whereas,

I^2 = heterogeneity of the study,
Q = chi square of the study and
df = degree of freedom of the study.

The value of I^2 is recoded 98.73 through fixed effect model which is very high. Then to reduce the independent studies variability, the random effect model is used. The value of I^2 is recorded -208.27 which is very low.

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c) Calculation of sample variability test (v)

The study variability is not occurred only due to the sampling error but also happened due to the population error. In this variability calculation, the weights of the each and every study have been adjusted with the constant value to reduce variability in the study.

$$v = \frac{Q-(k-1)}{\sum w-\left(\frac{\sum w^2}{\sum w}\right)}$$

Whereas,
v = variability of the study,
Q = Chi square value,
k = number of individual studies in this study,
w = weights of the study and
w^2 = squaring the weights of the study.

This variability of study helps to reduce the variability between independent studies. If the value of fixed effect models chi square and I^2 is more then, the sample variability test is used to apply the random effect model.

IV. Results and Discussions

This study has recorded the behavior, beliefs, perception and attitude towards technology adoption and e learning concept by students, teachers and administrators. Through the results of meta analysis chi square value, the students, teachers and administrators are shown positive attitude towards technology adoption and e- learning in higher education. The study findings showed that the young people from students, teachers and administrators accepted and implement the new e learning technology in higher education instead of aged people group. But the young people have less experience and adopt less use of e learning technology in higher education.

The teachers and students intended to use e learning technology in higher education but they need support to adopt e learning technology for better performance. It found that the respondents adopt the technology to enhance their performance, efficiency, accomplish the work on time and reduce the student's workload. This technology helps to communicate with each other, provide multiple solutions to learn more complex points, provide online tutorials, complete assignments on time and provide answers within a seconds to the human being. So, it is beneficiary for the teachers, students and administrators to adopt the e learning technology but they need training support, infrastructure, equipments and internet speed for improvement in their daily tasks due to their less experience in use of new technology.

The top level managers solve these problems to enhancing the use of e learning technology in higher education for better long term performance in every field. This study has recorded positive attitude of teachers, students and administrators with respect to technology adoption and e learning in higher education. Due to this, it can concluded that the teachers and students has increased their use of new technology while delivering their lectures, make their assignments, presenting their views in seminars, conferences and workshops.

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