Ilkogretim Online - Elementary Education Online, 2020; Vol 19 (Issue 3): pp. 3168-3178
http://ilkogretim-online.org
doi: 10.17051/ilkonline.2020.03.735482

Perceived "Outcome" Assessment On "Adoption" Of Digital Learning: A Perspective Of Faculty And Students

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Abstract:

Outcomes are the net-benefits that faculty and students observe and experience as an advancement in their scholastic outcomes, which are in the form of desired improvements and accomplishments due to adoption of technology mediated learning in B-Schools. Technology enabled teaching and learning has a significant influence on the Outcomes (OC) which faculty and students have strongly acknowledged to be important in an educational setting such as B-Schools. Adoption of digital learning strategies is accompanied by affects which will have a positive impact on teaching-learning outcomes.It is necessary to understand the net-benefits as a consequence of adoption and explore the resultant outcome of technology adoption and look at future research opportunities. Almost all theories and models related to technology adoption have been an adaptation of the previous theories and models which have had positive impact on technology adoption since technology is never stagnant. Through this research the perception of faculty and students are captured in terms of Outcome (OC) i.e.; net-benefits which are a result of adoption and utilisation of a technology driven environment in management education and research. The research will highlight significant outcomes which were identified after performing factor analysis and content analysis of interviews which will have important managerial implications in promoting a digital learning ecosystem in institutions, and to define to what extent it is feasible to have a learning culture and environment which is learner-centric and practical oriented in management education and research. This study will be an empirical research and cross-sectional in nature. The respondents of this study are management faculty and students from B-Schools across Bengaluru jurisdiction to ensure diversity among the sample population. The objective of the study is to establish the significant net-befits that essentially influence in adoption of digital learning environment to scale so that it will facilitate excellence and quality in management education and research. The relationship between the Predictor Variable: "Adoption" and Criterion Variable: "Outcome" was established F-Test using ANOVA and Linear Regression Analysis.Finally, the perceived "Outcome" statements established have been analysed individually for students and faculty using descriptive statistics.

Keywords: Outcome, Net-benefits, Digital Learning, Faculty, Students, B-Schools.

Introduction:

This study takes into account the relationship between two constructs Net-benefits which are the perceived "Outcomes" as a result of"Adoption" which is the actual behaviour of utilizing or technology mediated learning also known as "digital learning" in this era. The constructs "Adoption" and "Outcome" are well established through various studies o technology acceptance and also, these constructs have been found in D&M IS Success Model and UTAUT model, wherein the Net-benefits of Adoption (Use Behaviour/Utilization) is reviewed and is present in a large amount of publications which have used the technology acceptance evolution theoriessuch as the Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology Model (UTAUT), Diffusion of Innovation (DOI) and other encompassing theories such as the DeLone &McLean model IS Success Model (D&M IS Success Model) as theoretical basis (Lowry et al. 2007; Urbach et al. 2009b), typical item sets for each of the constructs have emerged which have often been used in several IS success studies. Given its high citation counts and the intense investigation of the model's propositions in a broad spectrum of contexts, it can be said

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that that the D&M IS Success Model should be part of a comprehensive compendium of IS theories. In fact, the 1992 article of DeLone and McLean (1992) was found to be the single-most heavily cited article in the IS literature (Lowry et al. 2007). Further based on the many contributions from researchers and practitioners to the first model of IS success. An updated DeLone and McLean proposed an updated IS Success Model (DeLone and McLean 2003). DeLone and McLean identified six dimensions which act as determinants of IS success, they are: system quality (SQ), information quality (IQ), use (actual use / use behaviour or adoption), user satisfaction (US), individual impact and organizational impact(Net-benefits).

The additional constructs that were identified and appended to the original model of IS success is Service Quality (SQ) which reflect the importance of service, the addition "intention to use" construct is a determinant and antecedent used to measure user attitude. "Net-benefits" or "consequential outcome" is a construct that which combines the best of individual impact and organizational impact from the original model. The choice of what impact should be measured depends on the system being evaluated, the purpose of the study, and the level of analysis (Urbach & Muller, 2011).
The Net-benefits or Outcomes of technology mediated learning can be evaluated using the IS success dimension of net-benefits as this constitutes the degree to which It leads to the success of the various actors or stakeholders in the environment being studied. The framework subsumes the previous distinct dimensions of the original D&M IS Performance Model's influence of Individual impact and organisational impact. Based on the framework being measured, the intent of the study, and the extent of research, the effect of consequential outcome (net-benefits) due to adoption (behavioral use or actual system use) should be calculated. Although use and user satisfaction are correlated with net benefits, there is still the necessity to measure net-benefits directly. Most of the studies applying the D&M IS Success Model measure the benefits of utilizing an IS at the individual and organizational levels. Therefore, in this study we measure the faculty and students perceived Outcomes (Net-benefits) upon Adoption of digital learning in Institutions for teaching and learning in B-Schools.

Methodology

Sample was selected using multistage sampling. The B-Schools were clustered in 5 zones and B-Schools were further selected after reviewing the student strength of B-Schools. Random selection of students respondents were selected from the B-Schools selected from these clustered zones. A sample size of 212 faculty respondents and 440student respondents wereconsidered for the study. Reliability of the measurement scale was checked using the Chronbach's alpha, Inter-Item Correlation Matrix was checked between the items of the construct Kaiser-Meyer-Olkin (KMO) Test and Bartlett's test measures the sampling adequacy for the constructs SPSS software was used to conduct the multiple regression analysis. The hypothesized relationship between the constructs Adoption and Outcome were tested withF-Test using ANOVA and Linear Regression Analysis.

Determining the Sample Size:
On the basis of the population size, the sample size will be selected based on appropriate statistical measures. To determine the sample size for faculty and students the Cochran's formula will be used since the population is

$$n_0 = \frac{z^2 pq}{e^2}$$

Considering the confidence level of 95% for Students population for Faculty population with the z-scores of 1.96:

Students: Sample size at 95% confidence level

p = 0.5; q =1-0.5 = 0.5; e = 0.05; z =1.96

Therefore, $n_0 = \frac{(1.96)^2(0.5)(1-0.5)}{(0.05)^2}$ = 384 sample size

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Faculty: Sample size 95% confidence level

p = 0.5; q =1-0.5 = 0.5; e = 0.07; z =1.96

Therefore, $n_0 = \frac{(1.96)^2(0.5)(1-0.5)}{(0.07)^2}$ = 196 sample size

Therefore, for Students data the sample size that is determined at 95% confidence with a margin of error +/- 5% level is 384 respondents. For faculty data the sample size that is determined at 95% confidence level with a margin of error +/- 7% is 196 respondents.

Research Gap:

There is paucity of research on investigating the potential driving factors that influence the adoption of technology among faculty and students. There have been few and scarce attempts to explore and understand the preferred digital learning strategies among the faculty and students, and the barriers to adoption of technology-mediated learning in B-Schools. There are very few published results that test the relationship between the constructs "Adoption" and "Outcome", and the impact of "Adoption" of technology-driven learning environment on the overarching "Outcomes" of faculty and students in an educational setting such as B-Schools.

Descriptive Data and Inferential Analysis

The Categorical variables such as age, gender and educational qualification are used in the survey questionnaire and the data collected presents the quantitative statistics forFaculty.

The perceived "Outcome" statements have been analysed individually for Faculty and Students using descriptive statistics.

The "Outcome" variable is associated with the net benefits an individual perceives to have experienced or will gain upon adoption of digital learning for teaching and learning. Here, the following statements identified during the course of literature review and personal interviews with faculty and students have been used for descriptive data analysis and each statement have been designated with OC1, OC2, OC3, OC4, OC5, OC6, OC7, & OC8:

OC1: Digital learning engages students & professionals to continuously learn and be future learners.
OC2: Access to "Open Educational Resources" (OERs)/e-library encourages deep learning of a concept.
OC3: Online courses/Quizzes such as MOOC's/SPOC's foster self-regulated learning.
OC4: Internet/PC/Mobile devices develop information literacy and digital literacy skills.
OC5: Technology enabled learning improves skills and capabilities among students and faculty.
OC6: Digital learning enriches quality of learning and promotes a learner centric approach.
OC7: Internet/Mobile/PC's improves participation in online communities and learn collaboratively.
OC8: Technology lowers the cost of academic life by making knowledge resources readily available.

Descriptive Data:

Demographic details of Faculty and Students

The Categorical variables such as age, gender and educational qualification are used in the survey questionnaire and the data collected presents the quantitative statistics for Faculty and Students.

Faculty:

Table.1a Educational Qualification: Faculty Respondents

Degree/Qualification	Frequency
M.Phil.	41
Master's Degree	74
Ph.D.	97

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Total	212

Table.2 a Gender: Faculty Respondents

Gender	Count of Respondents	Percentage (%)
Female	138	55%
Male	74	45%

Table.3 b Age: Faculty Respondents

Age Group	No. of Respondents	Percentage (%)
25 - 30 years	20	4%
30 - 35 Years	68	38%
35+ Years	124	58%

Students:

Table.1b Educational Qualification: Student Respondents

Degree/Qualification	Frequency
Non-Technical Degree (BBM, B.Com, BA, etc)	344
Technical Degree (B.Tech, BCA, B.Sc., etc)	96
Total	440

Table.2b Gender: Student Respondents

Gender	Count of Respondents	Percentage (%)
Female	174	36%
Male	266	64%

Table.3b Age: Student Respondents

Age Group	# of Respondents	Percentage (%)
21 - 30 years	396	89%
30 - 35 Years	40	9%
35+ Years	4	2%

1. **Reliability Analysis of the Constructs "Adoption" (AD) and "Outcome" (OC):**

➢ **Adoption (AD): Construct**

Adoption of Digital Learning is a another term used for the construct usage behaviour in this model and is defined as the degree to which the user displays acceptance and use of a new product, technology, and system for the purpose of teaching and learning. A measurement scale consisting of 4 items was used in assessing technology adoption by faculty and students in B-Schools. These items were identified during the literature review, and were subjected to test for consistency. Therefore, Cronbach's alpha was used as a measure to assess the reliability, or internal consistency, of a set of scale or test items. In other words, measurement's reliability for any given variable applies to the degree to which it

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is a reliable indicator and a consistent measure of a concept and Cronbach's alpha is one way to calculate the extent of that reliability.

Faculty Data:

Table 4.1a Inter-Item Correlation Matrix: faculty data

Inter-Item Correlation Matrix				
	AD1	AD2	AD3	AD4
AD1	1.000	.949	.854	.835
AD2	.949	1.000	.846	.818
AD3	.854	.846	1.000	.940
AD4	.835	.818	.940	1.000
**. Correlation is significant at the 0.01 level (2-tailed).				

This shows the unidimensionality of the measures of all four Items of the construct "Adoption". (AD1 – embrace, AD2- utilization, AD3 – apply, AD4 – employ)

Table 4.1b Reliability Statistics: Faculty data

Variable: Adoption (AD)	
Reliability Statistics: Outcome (OC)	
Cronbach's Alpha	N of Items
0.82	4

Table 4.1c KMO and Bartlett's Test: Adoption

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.761
Bartlett's Test of Sphericity	Approx. Chi-Square	2704.003
	Df	6
	Sig.	.000

The correlation coefficients for the four items, AD1-to-AD4 is greater than 0.8, and by checking the Kaiser-Meyer-Olkin (KMO) Test and Bartlett's test measures the sampling adequacy for the construct. The KMO results show a value of 0.761 is statistically significant and indicating adequacy of the sample and the Bartlett's Test of Sphericity (Chi-Square = 2704.003), is highly significant ($P<0.001$), therefore, the Bartlett's test indicates a strong relationship between variables.

Students Data:

Table 4.2a Inter-Item Correlation Matrix: Student's data

Correlations				
	AD1	AD2	AD3	AD4
AD1	1	.895	.726	.747
AD2	.895	1	.862	.767

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AD3	.726	.862	1	.811
AD4	.747	.767	.811	1
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 4.2b Reliability Statistics: Students data

Variable: Adoption (AD)	
Reliability Statistics: Outcome (OC)	
Cronbach's Alpha	N of Items
0.84	4

Table 4.2c KMO and Bartlett's Test: Adoption

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.809
Bartlett's Test of Sphericity	Approx. Chi-Square	1263.506
	Df	6
	Sig.	.000

The correlation coefficients for the four items, AD1-to-AD4 is greater than 0.8, and by checking the Kaiser-Meyer-Olkin (KMO) Test and Bartlett's test measures the sampling adequacy for the construct. The KMO results show a value of 0.809 is statistically significant and indicating adequacy of the sample and the Bartlett's Test of Sphericity (Chi-Square = 1263.506), is highly significant (P<0.001), therefore, the Bartlett's test indicates a strong relationship between variables.

- **Outcome (OC): Construct**

A measurement scale consisting of 8 items was used in assessing the outcome of technology adoption. These items were identified during the literature review, and were subjected to test for consistency. Therefore, Cronbach's alpha was used as a measure to assess the reliability, or internal consistency, of a set of scale or test items. In other words, measurement's reliability for any given variable applies to the degree to which it is a reliable indicator and a consistent measure of a concept and Cronbach's alpha is one way to calculate the extent of that reliability.

Faculty Data

Table 4.3a Inter-Item Correlation Matrix: Faculty Data

Faculty:	Inter-Item Correlation Matrix							
	OC1	OC2	OC3	OC4	OC5	OC6	OC7	OC8
OC1	1.000	.731	.645	.726	.800	.726	.870	.937
OC2	.731	1.000	.741	.834	.920	.834	.844	.782
OC3	.645	.741	1.000	.889	.806	.889	.741	.689
OC4	.726	.834	.889	1.000	.907	.787	.834	.775
OC5	.800	.920	.806	.907	1.000	.907	.920	.855
OC6	.726	.834	.889	.787	.907	1.000	.834	.775
OC7	.870	.844	.741	.834	.920	.834	1.000	.929

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OC8	.937	.782	.689	.775	.855	.775	.929	1.000

Table 4.3b Reliability Statistics: Faculty data

Variable: Outcome(OC)	
Reliability Statistics: Outcome (OC)	
Cronbach's Alpha	N of Items
0.971	8

Table 4.3c KMO and Bartlett's Test: Faculty data

KMO and Bartlett's Test: Outcome (OC)		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.722
Bartlett's Test of Sphericity	Approx. Chi-Square	6198.132
	Df	28
	Sig.	.000

The correlation coefficients for the four items, OC1-to-OC8 is greater than 0.8, and by checking the Kaiser-Meyer-Olkin (KMO) Test and Bartlett's test measures the sampling adequacy for the construct. The KMO results show a value of 0.722 is statistically significant and indicating adequacy of the sample and the Bartlett's Test of Sphericity (Chi-Square = 6198.132), is highly significant (P<0.001), therefore, the Bartlett's test indicates a strong relationship between variables.

Students Data:

Table 4.4a Inter-Item Correlation Matrix: Students Data

Students:	**Inter-Item Correlation Matrix**							
	O1	O2	O3	O4	O5	O6	O7	O8
O1	1.000	.980	.762	.837	.856	.706	.770	.818
O2	.980	1.000	.765	.843	.862	.703	.773	.824
O3	.762	.765	1.000	.885	.893	.785	.985	.878
O4	.837	.843	.885	1.000	.956	.857	.882	.920
O5	.856	.862	.893	.956	1.000	.869	.909	.949
O6	.706	.703	.785	.857	.869	1.000	.786	.832
O7	.770	.773	.985	.882	.909	.786	1.000	.875
O8	.818	.824	.878	.920	.949	.832	.875	1.000

Table 4.4b Reliability Statistics: Students Data

Variable: "Outcome" (OC)

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Reliability Statistics	
Cronbach's Alpha	N of Items
0.977	8

Table 4.4c KMO and Bartlett's Test: Students Data

KMO and Bartlett's Test: Outcome (OC)		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.864
Bartlett's Test of Sphericity	Approx. Chi-Square	8268.177
	Df	28
	Sig.	.000

The correlation coefficients for the eight items, OC1-to-OC8 is greater than 0.7, and by checking the Kaiser-Meyer-Olkin (KMO) Test and Bartlett's test measures the sampling adequacy for the construct. The KMO results show a value of 0.864 is statistically significant and indicating adequacy of the sample and the Bartlett's Test of Sphericity (Chi-Square = 8268.177), is highly significant (P<0.001), therefore, the Bartlett's test indicates a strong relationship between variables.

5.Test for Relationship between the Variables: "Adoption" and "Outcome"

Two Variables are considered in this analysis, the Predictor Variable: "**Adoption"** and Criterion Variable: "**Outcome"**.

5.1. F-Test using ANOVA and Linear Regression Analysis: Faculty Data

Table 5.1a Model Summary: Faculty data

Model Summary			
Model	R	R Square (R^2)	Adjusted R Square
1	.914[a]	.928	.918
a. Predictors: (Constant), AD			

From the Model Summary Table 2.1a, It can be observed that R^2 values are greater than 0.7, therefore, it can be said that there exists a strong relationship between the variables.

Table 5.1b ANOVA table: Faculty data

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	88.352	1	88.352	17842.172	.000[b]
	Residual	1.080	210	.005		
	Total	89.431	211			
a. Dependent Variable: OC						
b. Predictors: (Constant), AD						

F (1,210) = 17842.172, p<.001, R^2=0.928. Therefore, this shows that the overall relationship between Adoption (AD) and Outcome (OC) variable is considered is significant.

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Table 5.1c Linear Regression: Faculty data

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t-statistic	Sig.
		B	Std. Error	Beta		
1	(Constant)	.067	.033		2.031	.043
	AD	.976	.007	.984	133.575	.000
a. Dependent Variable: OC						

Inference: The predictor variable Adoption (AD) has a statistically significant P-value< .000 which suggests that Adoption (AD) has a significant influence on the variable Outcome (OC).

5.2. F-Test using ANOVA and Linear Regression Analysis: Students Data

Table 5.2a Model Summary: Students data

Model Summary			
Model	R	R Square (R^2)	Adjusted R Square
1	.710[a]	.768	.766
a. Predictors: (Constant), AD			

From the Model Summary table5.2a, It can be observed thatR^2values are greater than 0.7; Therefore, it can be said that there exists a strong relationship between the variables.

Table 5.2b ANOVA table: Students data

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	21.540	1	21.540	1888.571	.000[b]
	Residual	106.520	438	.243		
	Total	128.060	439			
a. Dependent Variable: OC						
b. Predictors: (Constant), AD						

F (1,438) = 1888.571, p<.001, R^2= 0.768. Therefore, this shows that the overall relationship between Adoption (AD) and Outcome (OC) variable considered is significant.

Table 5.2c Linear Regression: Students data

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.029	.184		16.446	.000
	AD	.368	.039	.410	9.411	.000
a. Dependent Variable: OC						

Inference: The predictor variable Adoption (AD) has a statistically significant as P-value < .000 which suggests that "Adoption" (AD) has a significant influence on the variable "Outcome" (OC).

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7. Conclusion:

The statistical analysis clearly signifies that there exists a strong relationship between the constructs "Adoption" (Use behaviour or actual Use) and "Outcome" (Net-benefits) for both the respondent groups faculty and students. And also, the scale Items for both the constructs Adoption and Outcome show good reliability results, or internal consistency, of a set of scale or test items. The study emphasized on the importance of utilizing technology mediate learning i.e.; adoption of digital learning which showed that it has a significantinfluence on the "Outcome" (Net-benefits).In an article by Granberg (2000) stated "Technology improves the dynamics between teachers and students, often leading to enhanced learning" and also quoted Prof. Tomarken, faculty of Vanderbilt University that "Students can see that faculty are doing a lot of work to further their education leading them towards an appreciation factor that ultimately contributes to their own motivation. Therefore technology is a real way of communicating to students the importance of innovation".

The overall study showed that sustained learning requires a pull approach to allow e-courses to be accessed by learners as they wish. When market expectations and business needs change, educators should align the same courses again to re-engage employees. Learners can earn rewards and badges on completing a certain level, thereby motivating students and teacher to take up online training programs. Upon reaching a certain level, learners will gain bonuses and certificates, thereby inspiring students and teachers to take up online training programmes. Through continuing learning opportunities, students and staff are continually studying, keeping for a long time and working together to develop their ability of market and technologies. New-age learners' educational and technical expectations are complex and thus make the learning process constant while at the same time engaging learners. With continuous learning experiences, students and faculty constantly learn, retain for long and work in collaboration to improve their business and technology acumen.

The training and professional needs of new-age learners are dynamic, thereby making the learning curve continuous and engaging at the same time. By moving to higher levels of digital literacy, students and teachers will be able to master and manipulate more complex digital technologies and tools, increasing their absorptive capacity and innovative capability. Institutions conduct seminars that reaching a larger audience from different regions for a smaller fee and also effectively protecting the finances of the students and faculty, students will not receive a lesser knowledge by using digital tools to connect, learn, and collaborate. Perhaps not all should be evaluated in terms of financial gain and cost reductions when it comes to quality in higher education; there are much more critical factors of why and how learners are willing to pursue a truly beneficial education while they enter university, college or the workforce, and this is how e-Learning gets the upper hand here. Currently, internet and online learning provides the most comprehensive array of instructional content that can lead to cost benefit, effective and accessible business education, offering financial value and reduced costs at the same time.

The utilization of the educational technology platforms has made learning in recent history substantially more fun than any other moment. Students engage in a wide range of classroom activities and independent learning tasks that significantly improve the long - term retention concepts. Virtual environments, electronic data, records and documents, electronic mail and fax instead of printed memos, virtual research labs, electronic teaching materials, as well as plenty of unlimited online resources help institutions save resources , time and money by delivering remarkable educational experiences, opportunities, and knowledge for students and teachers. The underlying technology that makes all this possible, like the high-speed internet with great coverage and tablets that students and faculty can actually afford, is a far better situation just 10 years ago. Transportation costs can also be considerably reduced when college students choose to take online courses, everyday cost of living can add up significantly for college students; a better option is to blend the curriculum requirements that can be accessed from home and classroom such as the flipped classroom which can reduce expenses of travel and saves time. Students and faculty go online for the purpose of completing taking online courses that are relevant to their specialization and enhance knowledge.

Further developments have culminated in the introduction of omnipresent technologies that shift learning modes away from mobile learning to omnipresent learning that emphasizes learning can take

place at anytime and anywhere without time, position or atmosphere limitation (Hwang et al.). In general, the smart learning experience is successful, productive and engaging (Merrill 2013). The learner is often viewed as the center of the smart learning system. The aim of the smart learning ecosystem is to provide self-directed, self-motivated and customized programs that students can attend at their own speed and access customized learning content. Digital learning environments are characterized as physical environments built around by taking into consideration some key features such as collaboration, personalization, universal design, accessibility, etc; and also filled with interactive, context-aware and responsive devices to foster learner-centric environment and promote teaching-learning quality.

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