

FACTOR ANALYSIS OF E-LEARNING USAGE

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Abstract: *Due to the recent event, happening around the world, the E-Learning approach has continued to increase at a rapid pace at universities and institutions. However, eventhough the use of e learning has grown and the e-learning progress is high and give strategic positioning, the question remain is that how the current user look at the usage of e-learning in their learning process. There are still many challenges in E-learning implementation and process The study use factor analysis method using SPSS in this study, Descriptive statistic, factor analysis, KMO & Bartlett's test, rotated component factor are utilized in this study to have test battery outcome. The study uses 23 sample from Asia-Pacific International University in Thailand. With respondend from Indonesian students and lecturer. The results shows that factors in the analysis of e-learning usage at Asia-Pacific International University. The following are factors the approval of respondent of the e-learning usage in the university that helped them: System Visibility, Material Relevance and Depth using E-Learning, Support Class Learning, and System Connectivity, Help Option & Documentation, System Design, Appearance & Color, Error & Shortcut & System Repair Guide. These factors is the result of the study that was divided in three components they are "System Support," "System Design," and "System Repair." Thus, the features shown in the results such as system support, system design and system repair can help management in maintaining and enhancing e-learning program.*

Keywords: *Factor Analysis, E-Learning, Asia-Pacific International University*

Introduction

Every company and institution are in pursuit of a set of goals. Some has a tendency to only seek profits whereas; some company's has a goal not only to maximize profits and maximize shareholders or their owners but also try to maximize the wealth of their stakeholders; other companies see themselves as non-profit. Looking at this, companies therefore are in need to benefit their stakeholders.

Higher education institution is an essential pillar of the development of a society. The institution is an actual producer of educated people. Likewise, higher education institution needs to take their service to their students seriously. Having an education insitution that can prepare one person and equipped them with physical mental, social and spiritual sense and awareness is an institution to look for. In this sense, students know that they can strive in their academic life for the purpose to achieve their life dream.

Due to the recent event, happening around the world, the E-Learning approach has continued to increase at a rapid pace at universities and institutions. Roc Search (2003) look at the normal

increase rate of the use of E Learning about 10 to 15 percent every year in open universities and institutions. However, eventhough the use of e learning has grown in billion dollar (Okiki & Asiru, 2011), and the e-learning progress is high (Little John et al., 2008; Shee & Wang, 2008), moreover that it give strategic positioning (Allen & Seaman, 2008), the question remain is that how the current user look at the usage of e-learning in their learning process. Ehlers (2004) see that there are still many challenges in E-learning implementation and process

Significant of the Study

The use of this research is very important for university researchers, in supporting institutional programs for their faculties. As additional information, this research can also be used as a decision-making tool for school management both university and other higher education institutions.

Theoretical Foundation

The literature varies in their views on e-learning. Kuo (2010) sees in term of student satisfaction, they tend to look on their education experiences. Experience in the education is deemed important. Moreover, Chua (2004) look on how a satisfied student as part of business continuity and growth in midst of competition.

E-learning is a concept derived from the use of information and communication technologies (Penny, 2011). Dalsgaard (2008) stated that, the use of e-learning gives opportunities for education development. He sees the technology gives advantages, even students can adapt and moreover materials can be reused.

Therefore, it is not farfetch that Christie & Ferdos (2004) sees e-learning in higher education as a technique to educate students with or without their instructors using digital media. Garrison & Anderson (2003) sees it as teaching and learning facilitated using network technologies. This technology can be used to replace the old traditional method of face-to-face meeting, this shows the advantage of e-learning that flexible, fast and no geographical barriers (Concannon et al., 2005; Sivapalan & Cregan, 2005). Various studies on e-learning were conducted, there are studies on student access to communication areas (Davies & Graff, 2005); other studies see that active participation in online activities lead to better score and also satisfaction (Sivapalan & Cregan, 2005; Alavi & Dufner, 2005); participation in online activities also lead to retention rates (Rovai, 2002); and Vonderwell & Zachariah see the important of online learner participation.

Method of the Study

A questionnaire as a research instrument was developed and distributed to Indonesian community respondents at Asia Pacific International University (AIU), one of Southern Asia Pacific Division Higher Education Institution. There are approximately around 1500 students studying at the higher education institution. Based on the sample given there are 23 samples used for the studies and the results were tested and cleared using KMO and Bartlett's test to the students as general respondents. Factor analysis was used pertaining to analysis on dimensions of E-Learning Usage. The following relevant outputs of the study are as follows: Descriptive statistics, Factor Analysis, KMO & Bartlett's test, rotated factor. Verma (2013) stated KMO and Bartlett's test are utilized to see if the data is satisfactory for the study, as well

as variance that is shared among variables, and that which is explained. Other relevant output includes a scree plot, component loadings, and a varimax-rotated solution. Verma (2013) sees that by applying factor analysis the study will generate a test battery that shows the number of factors to be retained and the total variance explained by these factors. It will also discover which variables in each factor remain in the solution and their relative importance. It will also names-these factors according to their nature, and propose which tests can be utilized for surveying the student's respond on the usage of E-Learning at any higher education institution.

Result of the Study

The results of the study provided solutions to numerous concerns related to the study. The study used statistical software to process relevant outputs that have been specifically chosen for the discussion in the study. By using the factor analysis statistical method, the various method can determine the test battery for assessing the usage of E-Learning.

Descriptive Statistic

Table 1 shows the descriptive statistic results of the study.

Table 1. Descriptive Statistic

	N	Minimum	Maximum	Mean	Std. Deviation
System Visibility	23	2.00	5.00	4.0870	.79275
System Usage	23	3.00	5.00	4.0000	.67420
Material Relevance and Depth using E-Learning	23	2.00	5.00	3.6087	.98807
Help Option and Documentation	23	2.00	5.00	3.6522	.71406
Support Class Learning	23	2.00	5.00	3.7826	.95139
Effective Notification System	23	2.00	5.00	3.7826	.90235
Beginner E-Learning Guidelines	23	2.00	5.00	3.7826	.79524
Error and Shortcut	23	1.00	5.00	3.3913	.94094
System Control	23	2.00	5.00	3.8696	.81488
System Repair Guide	23	2.00	5.00	3.4783	.89796
System Navigation	23	2.00	5.00	4.0435	.87792
System Design	23	2.00	5.00	3.9130	.90015
System Connectivity	23	1.00	5.00	3.4783	1.20112
Appearance & Color	23	2.00	5.00	3.8696	.91970
Valid N (listwise)	23				

Looking at the use of mean and SD, the study see the respondent approval on e-learning usage in Asia-Pacific International Univeristy. Table 1 results indicated from the questions given, the respondent in overall give their approval with e-learning usage in the university. Descriptive statistical data also shows that their higher approval are on System Navigation (M = 4.0435), System Visibility (M = 4.087) and System Usage (M = 4.000). While their lowest approval on the e-learning usage are on System Repair Guide (M = 3.4783), System Connectivity (M = 3.4783), and Error and Shortcut (M = 3.3913).

KMO and Bartlett's Test

Table 2. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Adequacy.	Measure of Sampling	.698
Bartlett's Sphericity	Test of Approx. Chi-Square	242.908
	Df	91
	Sig.	.000

Table 2 displays the KMO test result, which expresses whether data size for the study in terms of factor analysis was adequate or not. Based on Table 2, the value is 0.698 and it is > 0.5; therefore, the data has an adequate size or the analysis. Further, Bartlett's test of sphericity was used to see if the correlation matrix was indeed an identity matrix (Verma, 2013), as postulated in the null hypothesis. Since the p-value of the correlation matrix was 0.000 which is < 0.01, which is significant, it was determined that the correlation matrix was not an identity matrix, and so the use of the factor model is suitable.

Communalities

The test given in terms of statistical result, resulted in indication that higher levels of shared variance among variables shows that most of their variability is explained by factors singled out in the analysis. The community threshold for variables is < .4; results below .4 are pondered to be removed from a model (Verma, 2013). The outcome given in table 3 demonstrate that the shared commonalities of all the variables are more than .4; therefore, all the variables are useful for the model.

Table 3. Communalities

	Initial	Extraction
System Visibility	1.000	.753
System Usage	1.000	.702
Material Relevance and Depth using E-Learning	1.000	.817
Help Option and Documentation	1.000	.866
Support Class Learning	1.000	.827
Effective Notification System	1.000	.557
Beginner E-Learning Guidelines	1.000	.569
Error and Shortcut	1.000	.711
System Control	1.000	.657
System Repair Guide	1.000	.800
System Navigation	1.000	.723
System Design	1.000	.874
System Connectivity	1.000	.694
Appearance & Color	1.000	.791

Extraction Method: Principal Component Analysis.

Eigenvalue

After rotation, Table 4 shows that the first, second and third factors explain 28%, 23%, and 21% respectively of the total variance. Thus, as seen in Table 4 that in combination, these factors can account for 73.865% of the data's total variance. The values of factors in the table displays that factor retained in the study are only for those factors with Eigenvalues 1 or higher. The first three factors have Eigenvalues that meet this requirement; they are the only ones that were retained in this study.

Table 4. Eigenvalues

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.499	53.566	53.566	7.499	53.566	53.566	4.059	28.996	28.996
2	1.478	10.558	64.124	1.478	10.558	64.124	3.279	23.424	52.420
3	1.364	9.741	73.865	1.364	9.741	73.865	3.002	21.445	73.865
4	.969	6.925	80.790						
5	.661	4.720	85.510						
6	.532	3.798	89.308						
7	.393	2.808	92.116						
8	.350	2.502	94.618						
9	.277	1.981	96.599						
10	.237	1.692	98.291						
11	.088	.629	98.920						
12	.065	.467	99.387						
13	.061	.437	99.824						
14	.025	.176	100.000						

Extraction Method: Principal Component Analysis.

Scree Plot

Scree Plot as seen in the figure, presents the scree plot that has been constructed by plotting each factor along the X-axis toward its eigenvalue, which is displayed along the Y-axis. This plot reveals that only three factors had eigenvalues higher than the bend in the diagram's "elbow". Therefore, only these factors were subjected to further analysis.

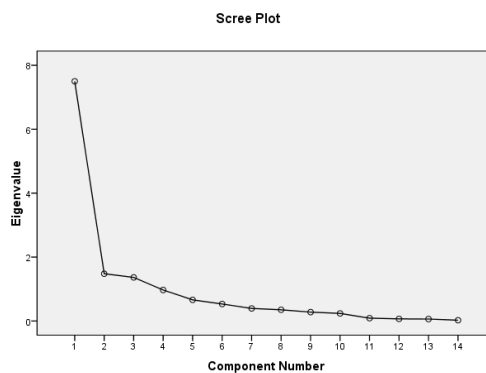


Figure 1. Scree Plot

Component Matrix

Table 5. Rotated Component Matrix^a

	Component		
	1	2	3
System Visibility	.831	.232	.094
System Usage	.501	.148	.655
Material Relevance and Depth using E-Learning	.803	.175	.378
Help Option and Documentation	.357	.814	.276
Support Class Learning	.834	.345	.109
Effective Notification System	.052	.332	.666
Beginner E-Learning Guidelines	.095	.456	.593
Error and Shortcut	.396	-.078	.740
System Control	.699	.269	.310
System Repair Guide	.204	.310	.814
System Navigation	.342	.686	.367
System Design	.162	.902	.187
System Connectivity	.770	.224	.226
Appearance & Color	.464	.751	.106

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 8 iterations.

Based on the statistical analysis, three factors were selected, and factor loadings for each variable are displayed in table 5. Variables usually are included in a factor if their loading is 0.7 or more. For this study, variables with factor loadings equal to or more than 0.7 were retained. Variables were grouped for each of three factors; a test battery for factors related to e-learning.

Our rotated component matrix shows that our first component is measured by System Visibility, Material Relevance and Depth using E-Learning, Support Class Learning, and System Connectivity. For the second component, the rotated component matrix shows that the component is measured by Help Option & Documentation, System Design, Appearance & Color. And for the third component, it is measured by Error & Shortcut & System Repair Guide. After interpreting all components in a similar fashion, we arrived at the following descriptions that three component is the one to be described as factor that have approval in the use of e-learning in Asia-Pacific International Univeristy. This is due to the three component is the one with variables with loadings equal or more that 0.7.

Test Battery

The results in Table 5 shows that factors in the analysis of e-learning usage at Asia-Pacific International University. The following are factors the approval of respondent of the e-learning usage in the university that helped them: System Visibility, Material Relevance and Depth using E-Learning, Support Class Learning, and System Connectivity, Help Option & Documentation, System Design, Appearance & Color, Error & Shortcut & System Repair Guide. These factors is the result of the study that was divided in three components they are “System Support,” “System Design,” and “System Repair.”

Conclusion

As stakeholder and recipients of academic services hold an important key to the higher education institution, it is important that continuous monitoring of their satisfaction and input. E-learning is a program that applicale in this 21st century, more so in this pandemic situation of COVID-19. This is one reason that university should be given the essential measurement and facts as input. In order to generate a battery of tests to incorporate e-learning usage approval, , respondents may prefer variety of these factors. Then one variable as the distinctive factor may be selected to generate a test to estimate the stakeholder satisfaction and approval with e-learning usage. Thus, the features shown in the results such as system support, system design and system repair can help management in maintaining and enhancing e-learning program.

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