

EFFECTIVENESS OF E-LEARNING ON THE Z-SCORE OF A/L STUDENTS IN SRI LANKA

W Premarathne^{1#}, J Ranasinghe², and VD Kithsiri³

¹Department of Management and Finance, General Sir John Kotelawala Defence University, Ratmalana, Sri Lanka

² Defence Services Command and Staff College, Sapugaskanda, Sri Lanka

³Examination Division, General Sir John Kotelawala Defence University, Ratmalana, Sri Lanka

wasantha.kdu@gmail.com

Abstract - With the influence of technology in the modern context, computer based learning methods have been introduced to the learning process as a means of presenting and sharing views and knowledge among communities. This is where the E-learning concept emerged in the scenario as an accepted instrument to enhance and support traditional teaching methods. After the rapid spread of the internet in the 1990s, E-learning has been spreading tremendously and has gained much popularity over the last decade in Sri Lanka. Nowadays it has become an important part of advanced learning. The majority of the students in urban areas have developed their skills better in computer literacy and the usage of E-learning facilities than the students in rural areas in Sri Lanka. Despite the norms of E-learning, it has been shown that a significant number of excellent A/L results have been achieved by the students in rural areas where there is a minimum usage of E-learning facilities available. Therefore, this research intends to find out the effectiveness of E-learning on the Z-score of A/L students in Sri Lanka. The questionnaire method and structured interview method were utilized to collect primary data. The sample consists of 50 first year undergraduate students from the KDU. These students were from Mathematics, Biology and Commerce streams. The number of hours E-learning facilities used per week, the number of private tuition hours per week and the number of self learning hours other than E-learning per week were identified as the independent variables, and the Z-score of the students was the dependent variable of the Multiple Regression model. Statistical measurements with the help of SPSS were utilized for the purpose of analysing the collected data. The R^2 test was utilized for testing the goodness of fit. The P value and F statistics were utilized to test the significance of the parameters and for testing the overall significance of the models. In addition, the Jarque-Bera (JB) test was used for testing the normal distribution of residuals. The study concludes that E-learning facilities used per week is having a strong significant impact for Z-score of the students than the number of private tuition hours per week and the number of self learning hours other than E-learning per week.

Keywords: E-learning, Z-score, Sri Lanka, A/L students

I. INTRODUCTION

The history of the education is dating back as long as the history of mankind. It can be segregated into two aspects considering the application of it. That is the pre history of education and the written history where it started distinctly to record for the future application. In the period of pre history it was based on demonstrations or rather copying by the youths from their elders or ancestors. However, at the latter stage this was formulated and structured, with conceiving the idea of religion or rites endemic to each society in which the tools were poems including the epic poems and hymns, stories, legends based on its rhythm and alternations. Education is a process which has been evolving over thousands years up to present context with many perspectives. Due to these multidimensional variations of education, even at present neither intellectuals, scholars and philosophers have capable enough to provide a clear and distinct definition for the education. However, most of them have developed a justifiable answer as to give a logical definition for the education. According to the Britannica Encyclopaedia (2014), education is “the process of educating or teaching or develop the knowledge, skill, or character of someone.”

In the modern day context, information has become a basic resource in developing country for their development in order to improve the quality of governance and socio economic developments (Suraweera & Liew, 2011).

Since the 1960s, E-Learning has evolved in different ways affecting business, education, the training sector, and the military. During 1980s with the rapid growth of the computer field, there was an intrusion of the computer base education into the school, university teaching curriculum (Kidd, 2010). The concept of E-learning has different facets: Online learning, Distance learning, Web based learning, Technology based learning, Computer based learning.

In present context many countries applied E-learning concept in schools in primary, secondary and tertiary education as the better support means to engage students

who do not response well for traditional classroom learning and provide more opportunities for the talent students to accelerate their performances and develop independent learning skills through a personnel experiences. According to the Boulton (2008) countries like UK, USA are providing a greater opportunity for school students at all levels to enhance the knowledge through an effective education via E-learning. It has been witness that the E-learning can result a higher retention rate due to materials being personalised and reflecting different learning styles. Education in Sri Lanka also is a fundamental right of every citizen which provides by the constitution itself. As per the UNICEF and the Central Bank of Sri Lanka, Sri Lanka is having the highest literacy rate in the South Asia and one of the highest in the Asia. Cross (2004) highlighted that the concept of E-learning introduced to the world in 1980s and it is known as computer based training (CBT). Mohamed & Husnayati (2008) further argue that "Though the literacy rate was high among the Asian counties the computer literacy was very low level until the recent time.

The introduction of Information Communication Technology (ICT) into the school system in Sri Lanka had taken more than two decades. However, this was accelerated into optimum after 2004. Nowadays most of higher educational institutions in Sri Lanka are offering E-learning facilities. In school level particularly targeting the secondary education, many programmes have been launched by the Government of Sri Lanka Island wide to enhance the effectiveness of E-learning. The state has implemented a large scale project throughout the Island to enhance the E-learning capacity in which the students are immensely benefitted. Therefore, necessity is remaining to study the effectiveness of this new teaching methodology to Advanced Level results of the students. Majority of students in Sri Lanka have developed their skills on computer science. Comparatively, it has been observed that the good result has been produced by the students in remote areas where minimum usage of E-learning facilities available.

With the influence of technology in the modern context, computer based learning methods have been introduced to the learning process as a means of presenting and sharing views and knowledge among communities. This is where the E-learning concept emerged in the scenario as an accepted instrument to enhance and support traditional teaching methods. After the rapid spread of the internet in the 1990s, E-learning has been spreading tremendously and has gained much popularity over the last decade in Sri Lanka. Nowadays it has become an important part of advanced learning. The majority of the students in urban areas have developed their skills better in computer literacy and the usage of E-learning facilities than the students in rural areas in Sri Lanka.

Despite the norms of E-learning, it has been shown that a significant number of excellent A/L results have been achieved by the students in rural areas where there is a minimum usage of E-learning facilities available. Therefore, this research intends to find out the effectiveness of E-learning on the Z-score of A/L students in Sri Lanka. The research focuses to study how effective the present use of E-learning in terms of producing best results in the secondary education in Sri Lanka.

II. LITERATURE REVIEW

Elias (2011) has defined learning as "Learning is a product of interaction depending on the epistemology underlying the learning design, learners might interact with instructors and tutors, with content and/or with other people". UNESCO (2012) defines learning as "a process that brings together personal and environmental experiences and influences for acquiring, enriching or modifying one's knowledge, skills, values, attitudes, behaviour and world views."

Tamez & Surles (2004) described learning "as an active process that starts with the learner. It consists of a relationship between the learner and the environment, their present and past experience, a natural or innate curiosity to know and the social interaction between each of us."

Thus, learning is a cerebral process of understanding reality of something with different dimension based on personals' ability of understanding which enhances the integration of both theoretical and practical knowledge. There are many different theories with different perspectives to explain how people learn.

'E-learning' the word itself gives an idea that learning through the means of electronic media. Though it is not certain the origin of the E-learning, the term is used in 1980s with the development of online learning. The definition of E-learning also has many arguments. Ellis (2004) explains that E-learning not only covers content and instructional methods delivered via CD-ROM, the Internet or an Intranet but also includes audio and videotape, satellite broadcast and interactive TV.

E-learning is self-service, allowing an individual great flexibility and control as well as access to hyperlinked interactive multimedia contents while learning at preferred paces and times. E-learning can support a virtual community that also enhances individual learning (Hu et al, 2005). According to Mayes and Freitas (2004) E-learning is the use of technology to support and enhance leaning practice.

The Joint Information Systems Committee (JISC) (2004) described E-learning as learning facilitated and supported through the use of information and communications technology, E-learning may involve the use of some, or all, of the technologies. Also it can cover a spectrum of

activities from supporting learning, to blended learning, to learning that is delivered entirely online. Whatever the technology, however, learning is the vital element. E-learning is no longer simply associated with distance or remote learning, but forms part of a conscious choice of the best and most appropriate ways of promoting effective learning.

Figure 1 illustrated that E-learning has an interrelated and intra related connectivity which depends on each others.

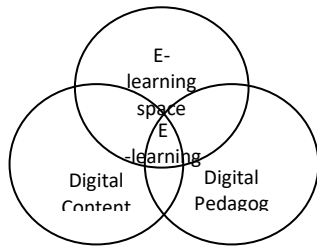


Figure 1: Components of E-learning

Source: Department of Education, Training and the Arts (2008)

At present Sri Lanka is implementing E-learning successfully in tertiary education. The Government has launched over 600 new E-learning centres all over the Island particularly focusing on school students to enhance their knowledge and as an aid to their learning actively (ICTA, 2014) Not only that but via various television channel also telecast number of learning programmes as an aid for students primarily for secondary education. The conceptual model in figure 2 depicts the impact of number of hours using E-learning facility, number of private tuition hours and number of self learning hours other than E-leaning on the Z-Score of the student in Sri Lanka.

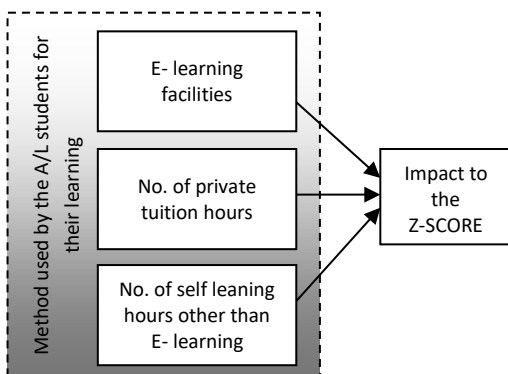


Figure 2: Conceptual framework

Source: Construct by the authors (2014)

III. RESEARCH METHODOLOGY

The study was based on both primary and secondary data. Primary data have been collected through the means of questionnaire and interviews form the selected sample. The sample was selected based on multi-stage sampling technique. The sample consists of 50 students who are

reading for Logistics Management degree at Kothalawala Defence University (KDU). A confidence level of 95 percent and 5 percent of confidence interval were selected when deriving the sample size. The sample represents students from different Provinces and from different streams of their GCE Advanced level examination. A total of 70 questionnaires were distributed among the selected sample. A total of 50 students who had responded well were selected and the remaining was rejected due to lack of information and failure to return the questionnaires.

Collected data were analysed using measures of central tendency, dispersion, skewness and multiple regression method. The effectiveness of usage of different types of learning methods on Z-score was analysed by using the following multiple regression model:

$$ZSC = f (NEH, NPH, NSH)$$

Where,

- ZSC Z-score
- NEH Number of E-learning Hours
- NPH Number of Private Tuition Hours
- NSH Number of Self learning Hours other than E-learning

Thus

$$ZSC = \beta_1 + \beta_2 NEH + \beta_3 NPH + \beta_4 NSH + e$$

The above model was estimated using SPSS application. MS Excel application also was utilized for the purpose of analysis of the collected data. Box plots were utilized for data screening. R^2 , p , and F tests were utilized for testing the goodness of fit, statistical significance of the individual parameters and for testing the overall significance of the model. In addition, the Jarque-Bera (JB) test was used for testing Normality.

The sample is limited to KDU and only the Logistics Management students were included to the sample. Heteroscedasticity and Multicollinearity were not tested in the study. Moderate Variable/s to the model was not incorporated.

III. RESULTS

According to figure 3, 41.9 percent of the samples use web sites, 12.9 percent use softwares, 22.5 percent use CDs and DVDs, 17.2 percent use mobile phones and 5.3 percent use of other means of tools and methods for E-learning.

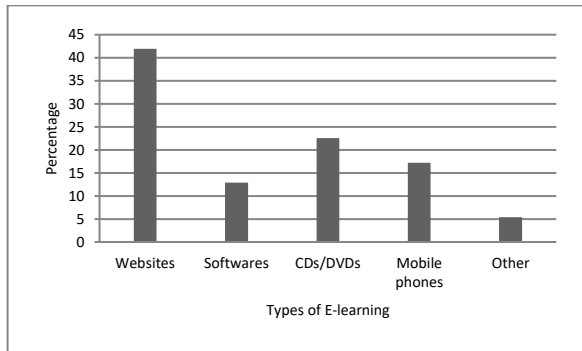


Figure 3: Use of E-learning tools and methods for Advance Level learning

Source: Survey data (2014)

Figure 4 depicts the opinion of the effectiveness of various tools and methods of E-learning on the results of advanced level examination. As per figure 4, 17 respondents mentioned that effectiveness of the websites is very high. Opinion of the effectiveness of use of mobile phones is very high for 5 respondents and 10 respondents indicated that as very low.

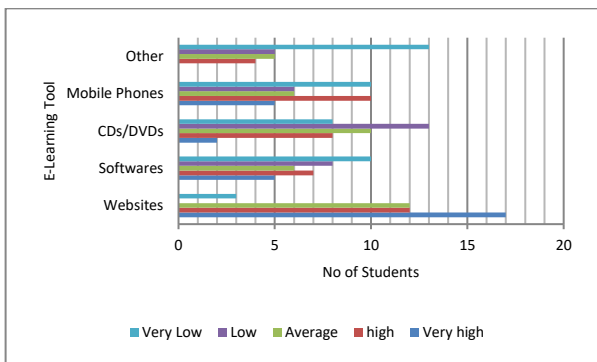


Figure 4 Opinion of the students on the effectiveness of E-learning tools and methods on the performance of GCE Advanced Level

Source: Survey data (2014)

As per table 1, 42 percent of the samples have gained awareness about the E-learning through colleagues and peers, 50 percent from the friends. Majority of the students (58 percent) have gained awareness about the E-learning through self awareness.

Table 1: Awareness of the respondents on E-learning

Means of awareness	Percentage
Colleagues and peers	42
Friends	50
Family	8
College staff	28
Advertisements/Leaflets	8
Self awareness	58
Other	6

Source: Survey data (2014)

The figure 5 indicates that most of the students (74 percent) use internet for E-learning between 5pm to 10pm. A very small number of students (4 percent) use internet for E-learning between 12 pm to 5 pm.

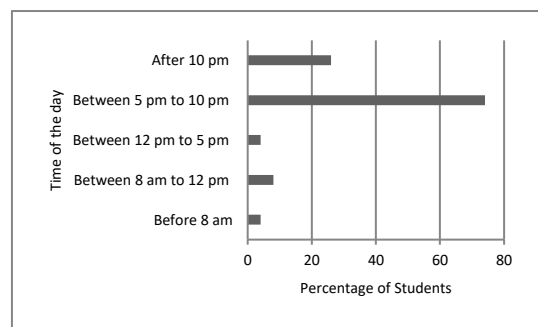


Figure 5: Usage of Internet for E learning according to time of the day

Source: Survey data (2014)

Opinion of the 30 percent of the sample was that E-learning is very useful for their advanced level learning and 2 percent indicates that E-learning is not useful at all. Figure 4 indicates the view of the sample on E-learning as a substitute for classroom teaching. According to the survey, 22 percent of the sample is strongly agreed on that E-learning as a substitute for classroom teaching. Opinion of the 34 percent on the matter was agreed.

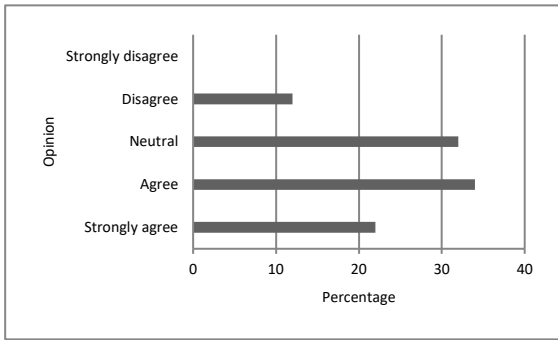


Figure 6: View of the student on E-learning as a substitute for classroom teaching
Source: Survey data (2014)

Mean value and the standard deviation of Z-score were 1.072262 and 0.487873 respectively. Mean value of E-learning hours per week was 10.44 and that for private tuition hours was 11.54. Mean value and the standard deviation of self earning hours were 10.00 and 3.785 respectively.

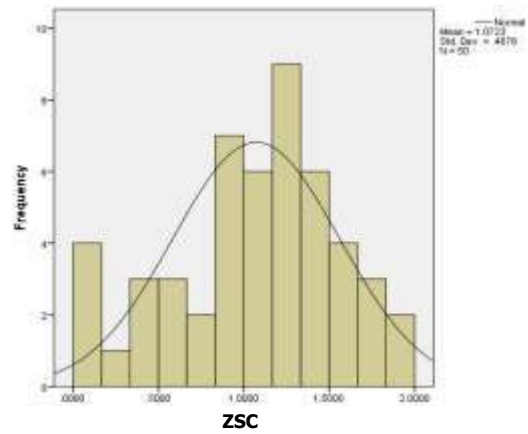


Figure 8: Distribution of the Z-score value
Source: Survey data (2014)

Figure 8 indicates that Z-score values are normally distributed among the sample.

DESCRIPTION		ZSC	NEH	NPH	NSH
Pearson Correlation	ZSC	1.000	.956	.343	.815
	NEH	.956	1.000	.280	.774
	NPH	.343	.280	1.000	.501
	NSH	.815	.774	.501	1.000
Sig.	ZSC	.	.000	.007	.000
	NEH	.000	.	.024	.000
	NPH	.007	.024	.	.000
	NSH	.000	.000	.000	.
N	ZSC	50	50	50	50
	NEH	50	50	50	50
	NPH	50	50	50	50
	NSH	50	50	50	50

Table 2: Correlations between the variables of the study

Source: Survey data (2014)

E-learning for higher education was strongly recommended by 26 percent of the sample while 2 percent do not recommend E-learning as a learning method in their studies (Figure 7).

As per table 2 there is a positive strong correlation (0.956) between Z-score and number of E-learning hours. Correlation between Z-score and number of private learning hours is only 0.343. Correlation value of 0.815 indicates a positive high correlation between Z-score and number of self learning hours.

From the correlation values in the Table 2, it was observed that high number of students who have effectively utilized E-learning more hours has gained high rate of Z-score for their Advanced Level examination. The scatter diagram in Figure 9 depicts the above relationship.

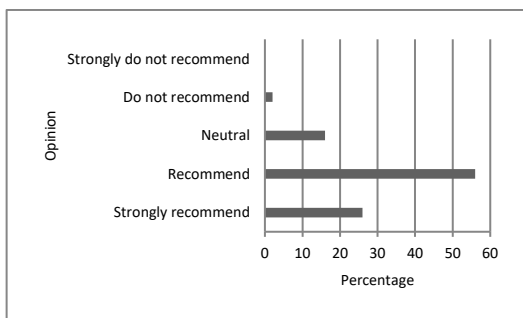


Figure 7: Opinion of the respondents for recommending E-learning for advanced learning
Source: Survey data (2014)

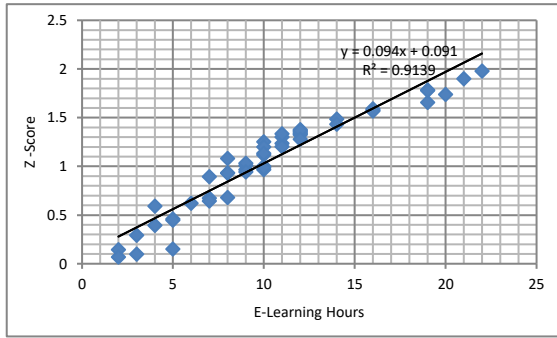


Figure 11: Relationship between self learning hours and Z- score.

Source: Survey data (2014)

Figure 10 and 11 indicate the relationship between Z-score and private tuition hours and Z-score and self learning hours. Both private tuition hours and self learning hours are having a positive relationship with Z-score. However, the relationship between private tuition hours and Z-score is weak since the R² is 0.12.

Figure 9: Relationship between E-learning and Z-score
Source: Survey data (2014)

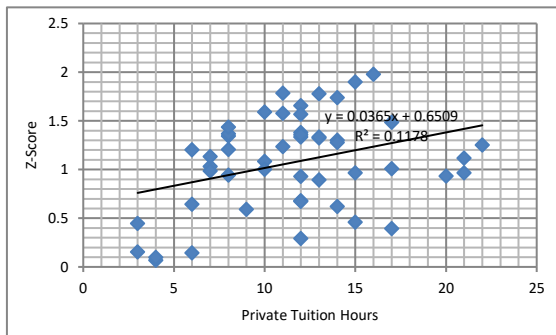


Figure 10: Relationship between private tuition hours and Z-score
Source: Survey data (2014)

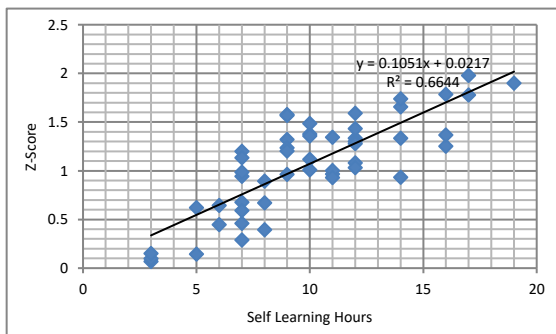


Table 3: Estimated coefficients and their significance levels

	β	Std. Error	t	Sig.
Constant	-.020	.061	-.333	.741
NEH	.081*	.006	12.927	.000
NPH	.003	.005	.664	.510
NSH	.021*	.009	2.366	.022

*Significance at 95% confidence level

Source: Constructed by the authors based on the regression output

The following regression equation can be derived based on the summary output in table 3.

$$ZSC = - 0.020 + 0.081 NEH + 0.003 NPH + 0.021 NSH$$

(0.061) (0.006) (0.005) (0.009)

R² value of 0.929 and adjusted R² value of 0.924 indicate that the model fits the data very well. Ninety three percent of the variation of the Z-score is explained by the number of E-learning hours, number of private tuition hours and number of self learning ours other than E-learning. Since the JB statistics of the model is 2.4 and the p value is 0.29, residuals are normally distributed.

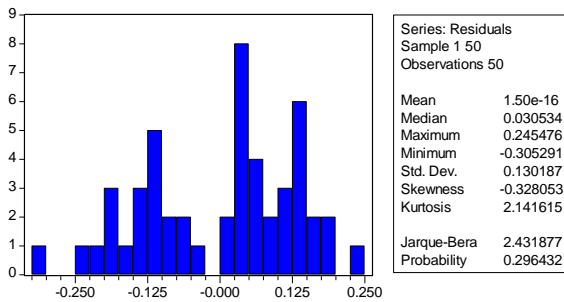


Figure 12: Histogram for the residuals of the model
Source: Residuals of the model (2014)

Together all the regressors have a significant impact on Z-score as the F statistics is about 199.979, whose *p* value is about zero. While keeping NPH and NSH constant, one unit increase in NEH, increases the Z-score by 0.081 units on average. While keeping NEH and NSH constant, one unit increase in NPH increases the Z-score by 0.003 on average. However, the coefficient value of NPH is not statistically significant. While keeping NEH and NPH constant, one unit increase in NSH, increases the Z-score by 0.021 on average.

IV. CONCLUSION

Developed countries are providing greater opportunity for school students at all levels to enhance the knowledge through an effective education via E-learning. Government of Sri Lanka has initiated the process of amalgamating the E-learning into the education system. The study highlighted that 58 percent of the students in the sample have gained awareness about E-learning through self awareness. E-learning facilities used per week is having a strong significant impact on Z-score of the students than the number of private tuition hours per week and the number of self learning hours other than E-learning per week. E-learning for higher education was strongly recommended by 26 percent of the sample. The survey indicates that 22 percent of the sample is strongly agreed on E-learning as a substitute for classroom teaching.

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