Volume: 3 Issues: 9 [June, 2018] pp.16-25]
Journal of Information System and Technology Management
eISSN: 0128-1666
Journal website: www.jistm.com

TEACHER'S SATISFACTION TOWARD THE VIRTUAL LEARNING ENVIRONMENT IN MALAYSIA

Hapini Awang
Zahurin Mat Aji
Wan Rozaini Sheik Osman[1]

[1]School of Computing, College of Arts & Sciences, Universiti Utara Malaysia, Malaysia.

Accepted date: 17 April 2018 **Published date**: 1 June 2018

To cite this document:

Awang, H., Aji, Z. M., & Osman, W. R. S. (2018). Teacher's Satisfaction toward the Virtual Learning Environment in Malaysia. *Journal of Information System and Technology Management*, 3(9), 16-25.

Abstract: *The current study was carried out to measure the level of teacher's satisfaction toward the Virtual Learning Environment (VLE) implementation in Malaysia. The population of the study consists of 97,503 teachers across the Northern Region of Peninsular Malaysia. By applying the simple random sampling procedure, 850 survey instruments were distributed to the target respondents. However, after the data screening procedure, only 643 instruments were usable for further analysis. The overall mean score of teacher's satisfaction toward VLE is 3.83. This mean score indicated that the satisfaction of experience using VLE technology among Malaysian teachers is at the moderate level. A possible explanation of this result might be related to the degree of information, system and service quality, accommodated by the VLE system and service provider to the teachers. Hence, the further examination is required to investigate the contributing factors of teacher satisfaction toward VLE implementation in Malaysia.*

Keywords: *Virtual Learning Environment; User Satisfaction; Teacher Satisfaction; Continuous Usage; Frog VLE; E-Learning*

Introduction

The Virtual Learning Environment (VLE) that is usually used in educational institutions, including schools is known as an efficient platform to improve the quality of teaching and learning. Nowadays, new kind of pedagogy strategies such as blended and online learning have become more popular with the development of VLE. As an Internet-based open system, VLE allows the mutual interactions among the participants and access to the unlimited spectrum of resources (Halonen, Thomander, & Laukkanen, 2010; Wilson, 1996). For instance, this platform supports various kinds of educational activities, including online quizzes, courses and tutorials (Abdelhag & Osman, 2014). The technology has also produced positive consequences

to its end-users, mainly teachers, students and parents (Ahmad, Piccoli, & Ives, 1998; Nor Fadzleen & Halina, 2013; Uzunboylu, Bicen, & Cavus, 2011).

Frog VLE

Malaysia is a multicultural country with the diversity of languages and ethnicities. In addition, this country also consists of rugged terrains such as islands, hills and rain forest jungles, which create the large gap between urban and rural area. Given the nature of the country's geographical, economic and sociological disparity, as well as the existing education system and infrastructure, it is expected that this country would face difficulty in uniting the citizens under a singular education system, and coping with the rapid shift of digital education, which happens globally. Consequently, this makes the ICT aspiration fundamental and urgent (XchangingGroup, 2014). Therefore, in 2012, the implementation of VLE has been initiated, known as Frog VLE. Furthermore, Malaysia is the first country in the world to provide the cloud-based learning platform that unites 5.5 million students, 10,000 schools, 500,000 teachers and 4.5 million parents nationwide. An enormous amount of budget, approximately RM1.475 billion, was allocated for this initiative (Kementerian Pendidikan Malaysia, 2014).

However, despite this large-scale investment, audit report indicates that the usage of ICT among teachers is low; 80% of the teachers use less than an hour in a week, including Frog VLE (between 19.5% to 33.5%) (Kementerian Kewangan Malaysia, 2014). Specifically, the analysis in March 2014 recorded that the Frog VLE utilization is within the range of 0.57% to 4.69%. This finding should be reflected as a red alert warning to the virtual learning education system researchers, as it denotes that the current implementation of such system is not in the right track of success that may lead to the abandonment of its usage. In light of this, the prior qualitative case study has found that some teachers voiced out the complaints about the poor quality of Frog VLE, expressing their dissatisfaction over the system (Cheok & Wong, 2016). This finding is congruent with the suggestion that user satisfaction as an important IS success dimension (DeLone & McLean, 2003). Clearly, this disquieting issue of dissatisfaction among the teachers requires a further investigation. Therefore, this study is performed to examine the current state of teacher's satisfaction regarding the VLE implementation in Malaysia.

Teacher Satisfaction

The teachers who did not satisfy with the VLE will most likely refuse to continue using it and henceforth contribute to the overall statistic of low usage. User satisfaction is usually regarded as the level of satisfaction or the users' responses to the output and the entire experience using the information systems (DeLone & McLean, 1992, 2004; Petter, DeLone, & McLean, 2008). Furthermore, it is known as a useful measurement to evaluate the mandatory information systems (DeLone & McLean, 2003). As for VLE implementation in Malaysia, there is the Key Performance Indicator (KPI) for its usage, even though it is not a total obligatory (Kementerian Pendidikan Malaysia, 2015b). Consequently, the teachers are compelled to use it up to the certain extent, and some principals or headmasters stipulate the minimum hours of usage for their teachers (Cheok & Wong, 2016). In this sense, the teacher satisfaction is a better dimension, instead of 'VLE usage' in determining the VLE success (DeLone & McLean, 2003).

In this study, teacher satisfaction refers to the perception of pleasure or displeasure caused by the teachers' level of belief that the VLE has fulfilled their needs or expectations. Different researchers may use distinctive measures for teacher satisfaction, depending upon the

objectives and the context of studies (DeLone & McLean, 2002, 2003). Specifically, the past E-Learning and VLE researchers used the measurement such as 'overall satisfaction', 'enjoyable experience' and 'recommended to others' to measure the teacher satisfaction (Eom, Ashill, Arbaugh, & Stapleton, 2012; Yengin, Karahoca, & Karahoca, 2011). Despite the variations in measuring teacher satisfaction by several previous studies, the current study proposed to measure it based on user surveys, enjoyment and overall satisfaction as suggested by DeLone and McLean (1992, 2003). However, after the procedure of face validity, content validity, factor analysis and reliability analysis, only enjoyment and overall satisfaction were retained to measure teacher satisfaction, which comprises of four items. Table 1 listed the operational definition for each measurement of teacher satisfaction. The items for these measurements were adapted from several sources.

Table 1: Measurements of Teacher Satisfaction

Measurement	Operational Definition	Item	Source
Enjoyment (DeLone & McLean, 1992)	The state of being pleasure after using the VLE by the teachers.	1. I feel contented with using Frog VLE.	(Zhou, 2013)
		2. I feel pleased with using Frog VLE.	(Zhou, 2013)
Overall Satisfaction (DeLone & McLean, 1992)	The overall teacher's feeling of satisfaction toward the VLE.	1. I think the Frog VLE is very helpful.	(Eom et al., 2012)
		2. I think the Frog VLE is successful.	(Gay, 2016)

Methodology

The descriptive quantitative study was carried out to describe the Malaysian teacher's VLE satisfaction. This type of study is administered under the real phenomenon, without manipulation of respondents and settings. Furthermore, the data collection was done using a cross-sectional survey field study. The survey research is appropriate for this study based on the following benefits; i) the ability to generalize the result from the sample to the population (Scandura & Williams, 2000), ii) high accuracy of the finding, since the instrument is specifically designed to address the issue under investigation (Slater, 1995).

Instrumentation

The structured survey instrument was constructed by adapting the items from previous instruments (Eom et al., 2012; Gay, 2016; Zhou, 2013) and reformulated them to suit the objectives of the current study. To ensure the validity and reliability, this instrument was orderly formulated in several stages. First, the pool of items retrieved from the literature was created. This pool contains seven possible items to measure teacher satisfaction toward VLE. For face validation, this instrument was presented to six experts; one language expert to check for language structure and grammar, three experts in IS and E-Learning to check for the items' accuracy, and two statisticians to check for scale development. After some amendments based on experts' suggestions, this instrument was then pre-tested to 16 respondents, who represent the personal trait's disparities of the prospect respondents (see Figure 1).

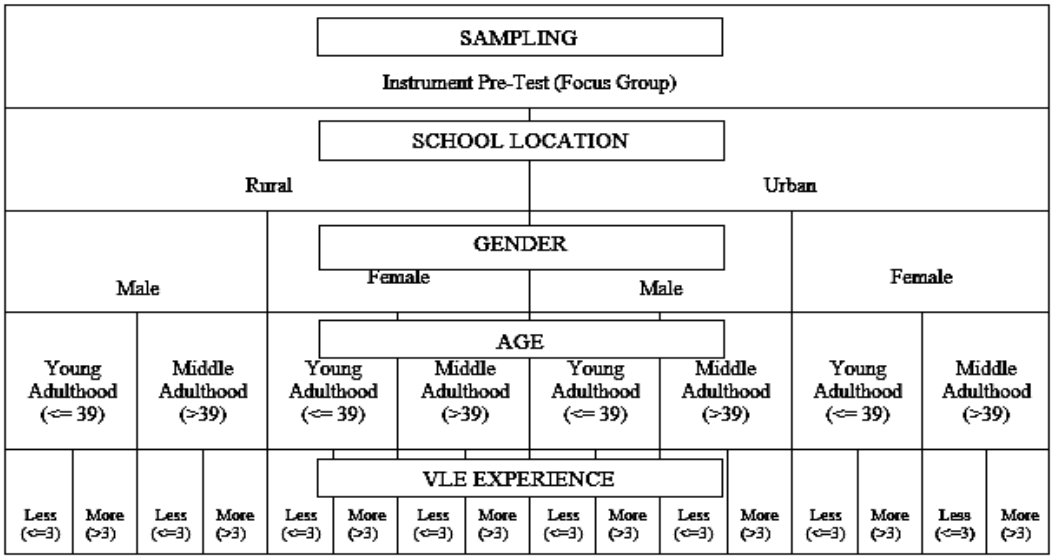

Figure 1: Sampling Procedure for Instrument's Pre-Testing (Face Validity)

Next, the content validation was done by seven experts in IS and E-Learning using Content Validity Index (CVI). The CVI was calculated to reach the agreement among the experts at the item level (i-CVI) and scale level (s-CVI). For i-CVI, the calculation was made using the following formula, with the acceptable cut-off value of 0.78 (Lynn, 1986).

$$\mathrm{i-CVI} = \left(\frac{nx}{ny}\right)$$

Where; *nx* refers to the total agreement among experts, *ny* refers to the total number of experts.

Furthermore, the s-CVI can be measured based on the averaging method (s-CVI/Ave) or universal agreement method (s-CVI/UA). The current study applied s-CVI/Ave method based on the following formula and the cut-off value of 0.8 (Davis, 1992). Table 2 shows the summary of CVI analysis using seven experts.

$$\mathrm{s-CVI/Ave} = \frac{(\sum i - CVI)}{nz}$$

Where; *nz* refers to the total number of items in the construct.

Table 2: Summary of CVI Analysis

No	Item	Total Agreement	i-CVI	Decision
1.	Most of the teachers bring a positive attitude towards the Frog VLE function.	5	0.71	Delete
2.	Most of the teachers bring a positive evaluation towards the Frog VLE function.	4	0.57	Delete
3.	I feel contented with using Frog VLE.	7	1.00	Retain
4.	I feel pleased with using Frog VLE.	6	0.86	Retain
5.	I think the Frog VLE is very helpful.	7	1.00	Retain
6.	I think the Frog VLE is successful.	7	1.00	Retain
7.	Overall, I am satisfied with the Frog VLE.	4	0.57	Delete
	s-CVI/Ave		**0.82**	**PASS**

Later, this instrument was piloted to 150 respondents. Using this pilot data, the factor analysis and reliability analysis were done. The factor analysis was done using the Exploratory Factor Analysis (EFA) by referring to these threshold values; Sphericity Bartlett Test < 0.5, Kaiser-Meyer-Olkin (KMO) > 0.8, Factor Loading ≥ 0.5, Communalities ≥ 0.3, and Eigen Value ≥ 1.0 (Hair, Black, Babin, & Anderson, 2010). As shown in Table 3, all the items to measure teacher satisfaction toward VLE passed the threshold values; therefore, no deletion was made during this stage. On the other hand, the reliability analysis was done based on internal consistency, which indicated by Cronbach's Alpha (CA) value. Consequently, the result has indicated that the instrument of teacher satisfaction achieved a high level of construct reliability (CA=0.97).

Table 3: Summary of Exploratory Factor Analysis

KMO	Eigen Value	Bartlett Test	Item	Loading	Communalities
0.81	3.68	0.00	3	0.96	0.93
			4	0.98	0.96
			5	0.96	0.91
			6	0.94	0.88

Data Collection Procedure

The population of this study is the teachers from the schools in the Northern Region of Peninsular Malaysia. The region was selected because it represents the second biggest region in the Peninsular Malaysia with the immensity of 32, 404 km^2 (Jabatan Perangkaan Malaysia, 2010). Moreover, this region has the largest school number of 2,347 or 32% of the total school population in Malaysia, operating by 97,503 teachers across the state of Perak, Penang, Kedah and Perlis (Kementerian Pendidikan Malaysia, 2015a, 2015c). The states in Malaysia are divided into two categories, which are developed and developing state, according to the Development Composite Index (DCI). Hence, the Northern Region was chosen because it is the only region that consists of both of developed (Penang and Perak) and developing (Kedah and Perlis) states (Norhaslinda & Dahlan, 2013). Equally important, the disparity of Internet penetration rate between these two categories of states is wide. The present statistic has illustrated that the developing states (Kedah and Perlis) only contribute 41.8% of overall Internet penetration in the Northern Region during the 3rd quarter of 2016 (Suruhanjaya Komunikasi & Multimedia, 2016). Therefore, the selection of both categories is important to ensure that the current study would capture all the characteristics of Malaysian socio environments. As the research has set the goal to examine the teacher's satisfaction toward the VLE implementation across both environments in Malaysia, the Northern Region is assumed to fulfill the research objective (Shareef, Kumar, Kumar, & Dwivedi, 2011).

For data collection, the simple random sampling procedure was applied. The list of primary and secondary schools in the Northern Region was used as the sampling frame, which was obtained from Educational Planning and Research Division (EPRD), Malaysian Ministry of Education (MOE). By referring to the sampling frame, a total number of 850 were distributed to 85 schools. This procedure of instruments' distribution was done by mail. At the school level, the randomizing procedure was done using the list of teachers, conducted by the headmaster or principal as an enumerator. To avoid any potential bias, the proper instruction was given to them on how to distribute the survey instrument. Table 4 presents the number of respondents in each state within the Northern Region.

Table 4: Number of Respondents Involved in This Study

State	Total No. of Teachers	Respondents
Perlis	4,817	170
Kedah	31,965	260
Penang	20,395	180
Perak	40,326	240
TOTAL		**850**

Data Analysis

After two months of data collection, 719 instruments were returned or about 84% response rate. Later, the data screening procedure was performed, which consist of the activities such as the analysis of missing value, outliers and normality. As a result, 719 cases were removed from the dataset, producing 643 usable data or 75.6% of valid response rate. The IBM SPSS Statistics (SPSS) version 21 was employed to analyze the data. As the instrument used seven points numerical scale, it needs to be converted to three classifications, which are low, moderate and high. This is to facilitate the process of analysis, interpretation and discussion of the finding. To compute the range between the categories, the following formula was used:

$$x = \frac{(y - 1)}{z}$$

Where; x is the range value between each group, y is the original scale points (in this case = 7) and z is the total groups to be generated (in this case = 3). Therefore, x =2;

$$\frac{(7 - 1)}{3} = 2$$

1.00 - 3.00: Low
3.01 – 5.00: Moderate
5.01 – 7.00: High

Finding and Discussion

The analysis of the respondents' demographic characteristic demonstrated that majority of the teachers are female (59.1%) aged below 40 years old (57.1%) as presented in Table 5. The gender issue is accurately reflected in this study as in almost all schools in Malaysia, the number of male teachers is less than females (Abu Bakar, 2006). Additionally, the average respondents' age is 39.85 with the minimum and maximum ages were 23 and 59 years old respectively. In terms of experience, most of the teachers have more than 14 years of teaching experience (47.9%). This was followed by those with eight to ten (20.1%) and eleven to thirteen (14.2%) years of experience. The rests are less than 10 years of experience (17.9%). Even though most of the respondents are experienced teachers, they are still considered new to Frog VLE as this application has been introduced for less than seven years ago. Teachers who have been the longest Frog VLE users, five years usage, represent the lowest number (4.80%), whilst the majority only experience using it for one year (29.1%).

Table 5: Demographic Characteristic of Respondents

Demographic Profile	Category	Frequencies (N=643)	Percentage (%)
Gender	Female	380	59.1
	Male	263	40.9
Age	<= 40 Years Old	367	57.1
	> 40 Years Old	276	42.9
Teaching Experience	≤ 1 Year	2	0.3
	2-4 Years	39	6.1
	5-7 Years	74	11.5
	8-10 Years	129	20.1
	11-13 Years	91	14.2
	≥ 14 Years	308	47.9
Frog VLE Experience	≤ 1 Year	187	29.1
	2 Years	151	23.5
	3 Years	153	23.8
	4 Years	78	12.1
	5 Years	43	6.7
	≥ 6 Years	31	4.8

Table 6 explains the responses of the four items to measure teachers' VLE satisfaction. The finding illustrates that most of the teachers have rated the moderate level in all the items; (1), (2), (3), and (4). To elaborate, 50.10% of them moderately believed that Frog VLE is useful, 49.50% feel contented, 49.30% feel pleased and 47.60% believed that Frog VLE is successful. Meanwhile, it is equally important to stress that the percentage of teachers with the low satisfaction (33.90%) is greater compared to those with high satisfaction (12.90%). Indeed, the different is relatively large, and can be seen in all the items; (item 1: Low, 40.60%; High, 10.00%), (item 2: Low, 39.30%; High, 11.40%), (item 3: Low, 37.50%; High, 12.40%), and (item 4: Low, 42.50%; High, 10.00%). To sum up, the mean of overall satisfaction is 3.82 and 342 of teachers advocated that they are moderately satisfied with the Frog VLE. This figure represents the largest portion of respondents or 53.20%. On the other hand, 218 (33.90%) teachers declared that they had a low satisfaction and only 83 (12.90%) are highly satisfied with the Frog VLE.

Table 6: The Level of Teachers' Satisfaction toward the VLE

Items	Low		Moderate		High		Mean
	%	n	%	n	%	n	
1. I feel contented with using Frog VLE.	40.60	261	49.50	318	10.00	64	3.80
2. I feel pleased with using Frog VLE.	39.30	253	49.30	317	11.40	74	3.85
3. I think the Frog VLE is very helpful.	37.50	241	50.10	322	12.40	80	3.90
4. I think the Frog VLE is successful.	42.50	273	47.60	306	10.00	64	3.73
Overall teachers' satisfaction toward VLE.	33.90	218	53.20	342	12.90	83	3.82

Concerning the finding, it is clear that the vision of MOE to digitalize Malaysian school education is still far from the target. As depicted by the analysis, there is a large breach exists, in terms of system's satisfaction among the teachers as the end users of Frog VLE. Despite the moderate level of overall satisfaction, the analyses of item 1 and 2 indicated that the percentage of teachers with a low level of satisfaction are bigger compared to those with the high satisfaction. This implies that the majority of teachers are unhappy with Frog VLE. Furthermore, this finding also signifies that the current VLE implementation is still failed to

meet the Malaysian teachers' expectation. In the longer run, this feeling of dissatisfaction would cause the rejection of the system, and increase the risk of total abandonment or failure.

In the same fashion, a closer examinations of item 3 which measure the VLE benefit (helpfulness), and item 4, measuring teacher's perception of VLE success, produced the approximately identical results. These items exemplify that the number of low satisfaction teachers are resolving the high satisfaction teachers in a quite big deviation. The reason for this is not clear, but it may have something to do with the quality of Frog VLE. For instance, in order for VLE system to be helpful, it needs to provide a relevant information, as required by the teachers to perform their teaching routines. In addition, the accessibility is also known as a vital determinant of teacher's VLE satisfaction. The teachers will most likely to feel satisfied when they perceived that the system provides convenience, high-speed and easy access. Certainly, the failure to provide these desired characteristics of system quality would cause the system to be burdensome instead of helpful for teachers.

Moreover, on the logical basis, the teachers would perceive the VLE implementation as successful if it is helpful for them. Nevertheless, by looking at the finding from this study, it is noticeable that the current infrastructures and facilities to support the VLE access are still inadequate, which is probably the main source of dissatisfaction among the teachers. Finally, in order for VLE to be perceived as helpful and successful, it also needs to provide sufficient supports and services. For example, Frog VLE is a new experience for Malaysian teachers, which calls for the major transition from their traditional pedagogical approaches. Perhaps, it seems possible that the moderate and low teacher satisfaction levels are due to the poor supports and service quality by Frog VLE and 1BestariNet as the service provider in Malaysia.

Conclusion

In this study, the teacher satisfaction was measured based on two criteria, namely the extent of enjoyment (contented, pleased) in item 1 and 2, and overall satisfaction (helpfulness, successfulness) in item 3 and 4. Contrary to expectations, despite the huge investment and provision by MOE, this study found that the teachers are not fully satisfied with their experience with VLE. In fact, the most obvious finding to emerge from the analysis is that the teacher's satisfaction toward the VLE in Malaysia is at the moderate level, with the overall mean value of 3.82. This finding can be explained in part by the proximity of user satisfaction and the quality dimensions (information, system and service quality) of VLE (DeLone & McLean, 2003). Hence, the further empirical examination into this matter is necessary. In line with the suggestion by DeLone and McLean (2003), the teacher satisfaction should be regarded as one of the crucial determinants of VLE success. Subsequently, the finding of this study should also be used as a foundation for future researchers to extensively investigate other factors that will influence the successful implementation of VLE in Malaysia. Finally, the findings from this study have provided useful insight regarding the current scenario of the VLE implementation in Malaysia. The scenario needs to be called upon the attention of the VLE stakeholders in Malaysia for future improvement.

References

Abdelhag, M. E., & Osman, S. E. F. (2014). SOA for Effective Data Integration of Virtual Learning Environment Systems. *International Journal of Advanced Research in Computer Science and Software Engineering*, *4*(6), 680–685.

Abu Bakar, N. R. (2006). Pendidikan dan Segregasi Pekerjaan Mengikut Gender. *Akademika, 67*, 53–75.

Ahmad, R., Piccoli, G., & Ives, B. (1998). Effectiveness of Virtual Learning Environments in Basic Skills Business Education: A Field Study in Progress. In *International Conference on Information Systems (ICIS)* (pp. 352–357). AIS Electronic Library (AISeL). Retrieved from http://dl.acm.org/citation.cfm?id=353053.353094

Cheok, M. L., & Wong, S. L. (2016). Frog Virtual Learning Environment for Malaysian Schools: Exploring Teachers' Experience. In J. Zhang et al. (Ed.), *ICT in Education in Global Context* (pp. 201–209). Singapore: Springer Science+Business Media. http://doi.org/10.1007/978-3-662-43927-2

Davis, L. L. (1992). Instrument Review: Getting The Most From a Panel of Experts. *Applied Nursing Research, 5*(4), 194–197. http://doi.org/10.1016/S0897-1897(05)80008-4

DeLone, W. H., & McLean, E. R. (1992). Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research, 3*(1), 60–95. http://doi.org/10.1287/isre.3.1.60

DeLone, W. H., & McLean, E. R. (2002). Information Systems Success Revisited. In *Proceeding of the 35th Hawaii International Conference on System Sciences* (pp. 1–11). Hawaii: IEEE Computer Society. http://doi.org/10.1109/HICSS.2002.994345

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems, 19*(4), 9–30. http://doi.org/10.1073/pnas.0914199107

DeLone, W. H., & McLean, E. R. (2004). Measuring e-Commerce Success : Applying the DeLone & McLean Information Systems Success Model Measuring e-Commerce Success : Applying the DeLone & McLean Information Systems Success Model. *International Journal of Electronic Commerce*, *9*(1), 37–41. http://doi.org/10.1080/10864415.2004.11044317

Eom, S. B., Ashill, N. J., Arbaugh, J. B., & Stapleton, J. L. (2012). The Role of Information Technology in e-Learning Systems Success. *Human Systems Management*, *31*(3–4), 147–163. http://doi.org/10.3233/HSM-2012-0767

Gay, G. H. E. (2016). An Assessment of Online Instructor E-Learning Readiness Before, During, and After Course Delivery. *Journal of Computing in Higher Education*. http://doi.org/10.1007/s12528-016-9115-z

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis* (7th ed.). Pearson Prentice Hall.

Halonen, R., Thomander, H., & Laukkanen, E. (2010). DeLone & McLean IS Success Model in Evaluating Knowledge Transfer in a Virtual Learning Environment. *International Journal of Information Systems and Social Change*, *1*(2), 36–48. http://doi.org/10.4018/jissc.2010040103

Jabatan Perangkaan Malaysia. (2010). *Preliminary Count Report 2010: Population and Housing Census of Malaysia*. Putrajaya, Malaysia. Retrieved from http://web.archive.org/web/20101227065717/http://www.statistics.gov.my/ccount12/click.php?id=2127

Kementerian Kewangan Malaysia. (2014). *Maklum Balas Ke Atas Laporan Ketua Audit Negara 2013 Siri 3*. Putrajaya, Malaysia.

Kementerian Pendidikan Malaysia. (2014). *Perkhidmatan 1Bestarinet*. Putrajaya, Malaysia.

Kementerian Pendidikan Malaysia. (2015a). Bilangan Sekolah Mengikut Jenis dan Negeri. Retrieved January 2, 2016, from http://www.moe.gov.my/my/statistik-sekolah

Kementerian Pendidikan Malaysia. (2015b). Pelaksanaan Penggunaan Pelantar Persekitaran Maya (VLE-Frog) 1BestariNet Kementerian Pendidikan Malaysia (KPM). Putrajaya:

Kementerian Pendidikan Malaysia. Retrieved from http://www.bptv.edu.my/v4/index.php/segera/327-pelaksanaan-penggunaan-pelantar-persekitaran-pembelajaran-maya-vle-frog-1bestarinet-kementerian-pendidikan-malaysia-kpm

Kementerian Pendidikan Malaysia. (2015c). *Perangkaan Pendidikan Malaysia 2015*. Putrajaya: Bahagian Perancangan dan Penyelidikan Dasar Pendidikan.

Lynn, M. R. (1986). Determination and Quantification of Content Validity. *Nursing Research*, *35*(6), 382–385. http://doi.org/10.1097/00006199-198611000-00017

Nor Fadzleen, S., & Halina, M. D. (2013). Knowledge Management Enhancement in Virtual Learning Environment (VLE) in Malaysian Schools. In *International Conference on Virtual Learning Environment (ICVLE)* (pp. 1–9).

Norhaslinda, H., & Dahlan, T. (2013). Ketidakseimbangan Wilayah Dalam Pembangunan: Satu Perbandingan Pekali Variasi Spatial di Malaysia dan Sumatera Utara. *Jati*, *18*(December), 73–88.

Petter, S., DeLone, W. H., & McLean, E. R. (2008). Measuring Information Systems Success: Models, Dimensions, Measures, and Interrelationships. *European Journal of Information Systems*, *17*(3), 236–263. http://doi.org/10.1057/ejis.2008.15

Scandura, T. A., & Williams, E. A. (2000). Research Methodology in Management: Current Practices, Trends, and Implications for Future Research. *The Academy of Management Journal*, *43*(6), 1248–1264.

Shareef, M. A., Kumar, V., Kumar, U., & Dwivedi, Y. K. (2011). E-Government Adoption Model (GAM): Differing Service Maturity Levels. *Government Information Quarterly*, *28*(1), 17–35. http://doi.org/10.1016/j.giq.2010.05.006

Slater, S. F. (1995). Issues in Conducting Marketing Strategy Research. *Journal of Strategic Marketing*, *3*, 257–270. http://doi.org/10.1080/09652549500000016

Suruhanjaya Komunikasi & Multimedia. (2016). *Buku Maklumat Statistik*. Cyberjaya: Malaysian Communications and Multimedia Commission.

Uzunboylu, H., Bicen, H., & Cavus, N. (2011). The Efficient Virtual Learning Environment: A Case Study of Web 2.0 Tools and Windows Live Spaces. *Computers and Education*, *56*(3), 720–726. http://doi.org/10.1016/j.compedu.2010.10.014

Wilson, B. G. (1996). Constructivist Learning Environments: Case Studies in Instructional Design. *Educational Technology Research and Development*, *44*(3), 99–101.

XchangingGroup. (2014). *Case Study Ministry of Education : 1Bestarinet*. Kuala Lumpur. Retrieved from https://www.xchanging.com/sites/default/files/XCH_CaseStudy_1BestariNet_May2014_0.pdf

Yengin, I., Karahoca, A., & Karahoca, D. (2011). E-learning Success Model for Instructors' Satisfactions in Perspective of Interaction and Usability Outcomes. *Procedia Computer Science*, *3*, 1396–1403. http://doi.org/10.1016/j.procs.2011.01.021

Zhou, T. (2013). An Empirical Examination of Continuance Intention of Mobile Payment Services. *Decision Support Systems*, *54*(2), 1085–1091. http://doi.org/10.1016/j.dss.2012.10.034