

# MODELING THE VIRTUAL LEARNING ENVIRONMENT SUCCESS AMONG MALAYSIAN TEACHERS: THE INITIAL INVESTIGATION

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**Abstract:** *The positive technological advantages of ICT had inspired the Malaysian Ministry of Education (MOE) to invest in digitalizing the Malaysian schools, including the implementation of Frog Virtual Learning Environments (VLE). Despite this huge investment, the ratio of usage is relatively low, especially among the teachers. This evidence indicates that there is an urgent requirement to conduct a post-implementation evaluation to investigate the factors behind the issue. Therefore, this study is conducted to develop a conceptual model based on the updated DeLone and McLean IS Success Model to evaluate the Frog VLE success among Malaysian teachers. As the study is still in the early stage, this paper will present the initial investigation that leads to the development of the conceptual model, including the background of the study, literature review and research methodology that the study wishes to employ. Finally, this study seeks to contribute some understandings on how the new Conceptual Model can predict the success of Frog VLE among Malaysian teachers.*

**Keywords:** *DeLone and McLean IS Success Model; Evaluation of IS Success; Frog VLE; Learning Management System.*

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## Introduction

The sophisticated development of ICT has sparked new inventions in teaching and learning approach. Currently, most educational institutions have implemented various forms of teaching style such as blended and online learning. Blended learning combines in-person teaching with an unusually high percentage of autonomous learning and online tutoring. These new teaching styles are made possible through Virtual Learning Environment (VLE) (Berns, Gonzalez-pardo, & Camacho, 2013). VLE is defined a decade ago as computer-based environments that are relatively open systems, allowing interactions with other participants

and access to a wide range of resources (Wilson, 1996). It offers various benefits compared to the traditional approach by promoting the “any time/any place” learning model (Ahmad, Piccoli, & Ives, 1998). Moreover, the introduction of VLE technology in education has significantly shifted the nature of conventional learning in six aspects; time, place, space, technology, interaction, and control (Piccoli, Ahmad, & Ives, 2001). VLE is commonly recognized as an Internet-based platform that supports various educational activities including online courses, quizzes, and tutorials (Abdelhag & Osman, 2014). Consequently, this technology has produced positive impact to the parent, students, and teachers (Nor Fadzleen & Halina, 2013) by promoting the dynamicity in learning especially in terms of defying the barriers of time and location (Uzunboylu, Bicen, & Cavus, 2011). The VLE technology also enables users to mutually interact with each other, both synchronously and asynchronously (Halonen, Thomander, & Laukkanen, 2010).

## **Literature Review**

### ***Frog VLE***

The VLE technology implementation in Malaysia was initiated by MOE under the 1BestariNet project to improve the previous version of SchoolNet service (Kementerian Pendidikan Malaysia, 2014). Through the initiative, MOE aims to connect the entire schools across the nation via cloud-based VLE, supported by high-speed 4G internet connections by the end of 2013 (Kementerian Pendidikan Malaysia, 2013). As a long-term investment, the 1BestariNet executions is expected to run for at least thirteen years and MOE believed that it will transform the Malaysian education sector by promoting a sustainable use of ICT in both areas of pedagogy as well as education management (Cheok & Wong, 2014; Norazilawati, Noraini, Nik Azmah, & Rosnidar, 2013).

Frog VLE, adopted from the United Kingdom (UK), is the most recent Learning Management System (LMS) implemented in Malaysian schools. One of the ultimate objectives of this initiative is to bridge the educational divide between rural and urban schools by providing equal digital education for every student, regardless of their locations. It is hoped that over 10,000 public schools, 5 million students, 500,000 teachers, and 4.5 million parents will be connected together in the virtual learning community, and therefore, boost the quality of Malaysian education up to the highest level.

However, the current report indicates low usage of Frog VLE, ranging from 19.5% to 33.5%, with only 0.57% to 4.69% of teachers’ usage (Kementerian Kewangan Malaysia, 2014). The paltry utilization of Frog VLE in schools is associated with at least two issues. First, a recent evidence has demonstrated that some teachers refuse to continue using the system, although they agreed on the benefits offered by Frog VLE (Cheok & Wong, 2016). Second, some studies also suggest an association between user satisfaction and the actual usage of VLE (Eom, Ashill, Arbaugh, & Stapleton, 2012; Mohammadi, 2015). This notion implies that the teachers who are not satisfied with the Frog VLE will most likely refuse to continue using it and henceforth contribute to the overall statistic of low usage. Nevertheless, the current literature on Frog VLE is found to be widespread with the lack of empirical evidence on its continuous usage and user satisfaction. Therefore, there is a need to empirically examine the factors behind both of these issues, particularly among the teachers.

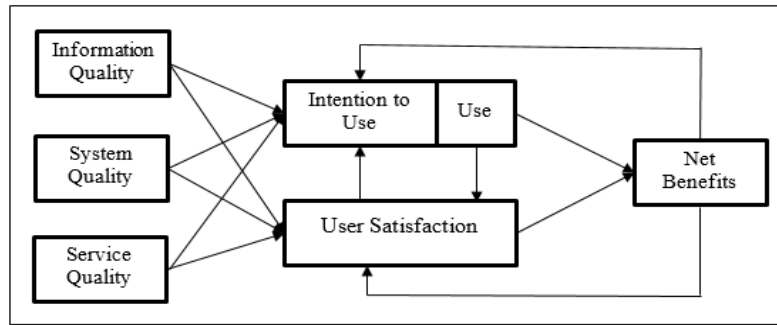
Regarding the trend of recent studies in Frog VLE, it is becoming extremely difficult to ignore the existence of teachers’ excessive workload as a major hindrance of its utilization

(Cheok & Wong, 2016; Norazilawati et al., 2013). While the body of research in the area suggests that undue workload may also have some impact on the use of Frog VLE (Abuhmaid, 2011; Raman & Yamat, 2014), empirical evidence on this is still lacking. Moreover, the literature is yet to reveal any attempt to structurally map out the relationship between workload and usage in the context of IS success. Equally important, the Personal Characteristics like Age, Gender and Experience are found to be influential in IS adoption, especially in determining the strength of usage (Venkatesh, Thong, & Xu, 2012). However, the plausible effect of these Personal Characteristics in evaluating Frog VLE success has not yet been clarified, so it is not obvious whether these characteristics are influential or the otherwise. This implies that the existing literature on IS evaluation lies on insufficient research in determining its predictors and thus requires further empirical investigations.

### ***The Updated DeLone and McLean is Success Model***

Various theories and models related to IS usage have been introduced including Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT). Nevertheless, IS usage is not representing the overall IS success, but it is one of the IS success dimensions (DeLone & McLean, 1992, 2003). According to DeLone and McLean (2003), IS success is the interrelated dimensions; therefore, it should not be measured based on only single dimension. This stance implies that several studies that examine a certain dimension, for example, IS usage (AlAwadhi & Morris, 2008; Jurisch, Kautz, Wolf, & Krcmar, 2015) and user satisfaction (H. H. Chang, Wang, & Yang, 2009; Dai, Kao, Harn, Yuan, & Chen, 2011) did not convey the whole concept of IS success. In addition, the continuous usage during the post-implementation stage is more significant in determining the IS success compared to initial use during pre-implementation (Bhattacharjee, 2001). As for this study, the continuous usage is identified as a prominent issue, illustrated by the low usage of ICT and Frog VLE (Johari & Siti Norazlina, 2010). Even though majority of the teachers have the initial Frog VLE experience, the current finding shows that they refused to continue using the system (Nor Azlah et al., 2014; Ummu Salma & Fariza, 2014), which reflect that the system is not on the right track of success.

From the literature, this study found that these issues could be engaged using the updated DeLone and McLean IS Success Model (D&M) (DeLone & McLean, 2003). Previous studies have proven that this model fits all the measurement for IS success evaluation (Al-Debei, Jalal, & Al-Lozi, 2013; Mohammadi, 2015). Therefore, this study uses it as the theoretical basis, with the inclusion of Workload and Personal Characteristics as the external moderating variables to measure the Frog VLE Success among Malaysian teachers. Although the updated D&M was developed for measuring e-commerce, its applicability in other IS streams has been proven by many studies. This model was introduced in 2003 as the response to the criticisms on the original version of IS Success Model by DeLone and McLean (1992). As an enhancement model, several adjustments have been made including the inclusion of Service Quality and the combination of Individual Impact and Organizational Impact into the single dimension known as Net Benefits. Furthermore, the updated D&M aim to produce a comprehensive understanding of IS success by describing the inter-relationship between six identified dimensions, namely Information Quality, System Quality, Service Quality, Intention to Use or Use, User Satisfaction and Net Benefits, as shown in Figure 1.



**Figure 1: The Updated DeLone and McLean IS Success Model**

DeLone and McLean (2003) suggested that their model should be continuously tested and challenged under different contexts, in order to increase its validity and reliability. For this reason, the previous researchers have made various alterations and refinement to the model. Nonetheless, the updated D&M remains the foundation model of these IS success evaluation studies. For example, a major study by Mohammadi (2015) that investigates the factors influencing E-Learning outcomes has included a number of external variables into D&M, including Educational Quality, Perceived Ease of Use, Perceived Usefulness, and Learning Assistance. In another study by Zoubib and Jali (2014), the relationships in D&M have been modified along with the inclusion of Relative Advantage, Compatibility, and Complexity to measure E-Learning adoption among adult workers. Also, some researchers choose to hybridize D&M with other models or theories such as TAM (Cheok & Wong, 2014; Hosnavi & Ramezan, 2010) and VLE Effectiveness Model (Eom et al., 2012). Despite the variability in adapting the D&M to suit the objectives and context of studies, the majority of researchers still believed that most of the constructs in the model are relevant in the evaluation of IS Success across different context and should be retained (Alshibly, 2014; J. V. Chen, Jubilado, Capistrano, & Yen, 2015; Wixom & Todd, 2005).

Based on the preceding discussion, this study concludes that the entire constructs in D&M are relevant to model the Frog VLE success among Malaysian teachers. More importantly, the preservation of all IS Success dimensions is congruent with the suggestion of DeLone and McLean (2003) to provide a comprehensive understanding of IS success while at the same time retaining the nature of interdependency between these dimensions. However, to investigate the issue of continuous usage (*why the teacher refused to continue using Frog VLE?*); this study will use both Intention to Use and Use while also adding the new relationship from Use to the Intention to Use. Although the Intention to Use was introduced by DeLone and McLean (2003) as an alternative measurement for Use, the separation of these two constructs will enhance the explanatory power of D&M (Agarwal & Prasad, 1997; Mardiana, Tjakraatmadja, & Aprianingsih, 2015). In addition, this study will also incorporate the Workload as the moderator since it has identified as a major issue that affects the ICT integration in education, including Frog VLE (Cheok & Wong, 2016; Raman & Yamat, 2014; Wu, Hiltz, & Bieber, 2010). Finally, the Personal Characteristics, which consist of Age, Gender and Frog VLE Experience, will be added to the D&M as another moderating variable, which is expected to influence the relationship between the Quality Dimensions and Intention to Use.

## Conceptual Model and Hypotheses

### Research Conceptual Model

The Conceptual Model for the proposed study, as shown below (Figure 2), is based on the updated D&M (DeLone & McLean, 2003). Comprises of eight interdependent determinants of success, this model suggests that the Quality Dimensions (Information Quality, System Quality, and Service Quality) will significantly influence the Intention to Use and User Satisfaction. Furthermore, the Personal Characteristics (Age, Gender and Frog VLE Experience) may moderate the relationship between the Quality Dimensions and Intention to Use. At the second level, the increasing Intention to Use should lead to more usage of the Frog VLE. By the same manner, the initial Use may also affect future Intention to Use, with the mediating effect of User Satisfaction. As a result of these Use and User Satisfaction, certain Net Benefits will occur, that will further lead to improvement of Intention to Use (moderated by Workload of the teachers) and User Satisfaction. At the same time, the teachers' Workload is also expected to moderate the relationship between Intention to Use and Use of Frog VLE.

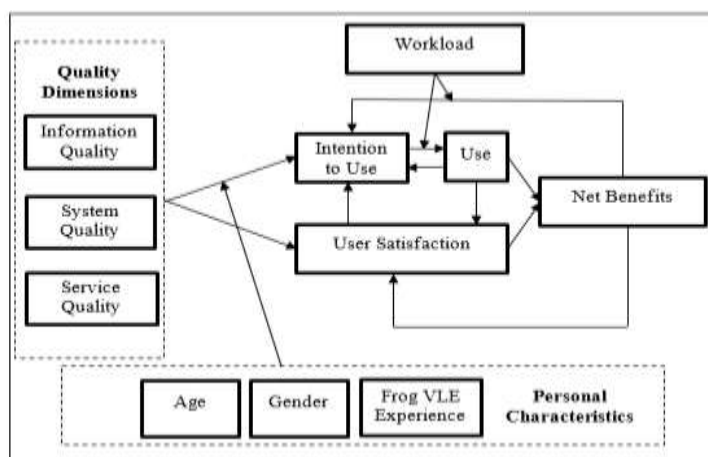


Figure 2: Research Conceptual Model

### Hypotheses

This study postulates that the Quality Dimensions will influence the Intention to Use of Frog VLE among Malaysian teachers, in the positive relationship. This assumption was supported by many previous studies that proved the significant relationships between Information Quality, System Quality and Service Quality to the Intention to Use (Al-Debei et al., 2013; Ramayah, Ahmad, & Lo, 2010). Hence, the following main hypothesis is proposed, and the detailed discussions of the sub-hypotheses are provided in the next paragraphs.

*H<sub>1</sub>: The Quality Dimensions have the significant influence on the Intention to Use of Frog VLE among the teachers.*

First, as a type of IS, the quality of information provided by Frog VLE is one of the crucial criteria of success in ensuring the continuous usage or intention of future use of the system (Al-Debei et al., 2013). Several recent studies investigating the relationship between Information Quality and Intention to Use have been carried out by IS researchers. As a result,

data from these studies have identified both significant (Al-Debei et al., 2013; C.-W. D. Chen & Cheng, 2009; Iivari, 2005) and insignificant (Halawi, McCarthy, & Aronson, 2008) of this relationship. Second, System Quality should have directly affected the Intention to Use; even though the density of the relationship may vary across different IS atmosphere (Teo, Srivastava, & Jiang, 2009). In this sense, it can be assumed that the Frog VLE that always available, easy to use and convenient to access will lead to greater intention to use in the future by the teachers. Nevertheless, the previous studies have demonstrated the mixed supported relationship between these variables. Some studies have found that System Quality is not related to Intention to Use (Agarwal & Prasad, 1997; Klein, 2007), while many other studies found it significant (Al-Debei et al., 2013; Ramayah et al., 2010). Third, on the practical basis, good support services by Frog VLE and 1BestariNet should motivate the teachers to continue using the system in the future. However, empirical examinations by a number of prior studies have shown that Service Quality only had a mixed support for its ability to explain Intention to Use (Al-Debei et al., 2013; Choe, 1996; Halawi et al., 2008). Building on the previous arguments and the inconsistency on the findings, this study believed that it the further exploration of the above-mentioned relationships are urgently needed. Therefore, the following sub-hypotheses are proposed:

*H<sub>1a</sub>: Information Quality has a significant influence on the Intention to Use of Frog VLE among the teachers.*

*H<sub>1b</sub>: System Quality has a significant influence on the Intention to Use of Frog VLE among the teachers.*

*H<sub>1c</sub>: Service Quality has a significant influence on the Intention to Use of Frog VLE among the teachers.*

This study postulates that if the teachers satisfied with the Frog VLE in term initial use, information quality, system quality and service quality, they will be inspired to use it again in the future. This notion is further supported by Al-Debei et al. (2013) who suggests that the individual who satisfied with the technology may have higher intention to use it later due to the positive reinforcement of attitude towards the technology. Moreover, the relationship between User Satisfaction and Intention to Use has been supported in a number of empirical studies (Al-Debei et al., 2013; Halawi et al., 2008; Wixom & Todd, 2005). In light of this, the current study proposes the following hypothesis:

*H<sub>2</sub>: User Satisfaction has a significant influence on the Intention to Use of Frog VLE among the teachers.*

According to the updated D&M, the initial use and the intention to use in the future can be different under certain circumstances. By referring to two important studies (Agarwal & Prasad, 1997; Karahanna, Straub, & Chervany, 1999), the model described that the positive experience with the inaugural use should lead to user satisfaction and thus increase the attitude toward usage in the future. Comparatively, this study (post-implementation) assumed that all the teachers are continuance users as all the teachers are provided with personal IDs by 1BestariNet and required to create Frog VLE account (1BestariNet, 2012). Therefore, the positive initial use of Frog VLE is expected to increase their intention to continue using it in the future. Considering the preceding discussion, this study proposes the following hypothesis:

*H<sub>3</sub>: Use has a significant influence on the Intention to Use of Frog VLE among the teachers.*

The positive Net Benefits is expected to lead to future Intention to Use (DeLone & McLean, 2003). In other words, the teachers will intend to continue using Frog VLE if they perceived that the system is beneficial to them. Moreover, the relationship between Net Benefits and Intention to Use also has been supported by the number of empirical studies (Al-Debei et al., 2013; Fang, Chiu, & Wang, 2011; Zheng, Zhao, & Stylianou, 2013). Therefore, this study proposes the following hypothesis:

*H<sub>4</sub>: Net Benefits has a significant influence on the Intention to Use of Frog VLE among the teachers.*

This study postulates that the Quality Dimensions will influence the User Satisfaction of Frog VLE among Malaysian teachers in the positive relationship. This assumption is supported by the previous studies that proved the significant relationship between Information Quality, System Quality and Service Quality to the User Satisfaction (Al-Debei et al., 2013; Hsieh, Rai, Petter, & Zhang, 2012). Therefore, the following main hypothesis is proposed, and the detailed discussions of the sub-hypotheses are provided in the next paragraphs.

*H<sub>5</sub>: The Quality Dimensions have the significant influence on User Satisfaction of Frog VLE among the teachers.*

Information Quality will positively influence User Satisfaction on the direct relationship (DeLone & McLean, 2003). In other words, the user will be satisfied if the IS produced precise, updated, relevant, and appropriate information. Thus far, a growing body of empirical research that examined the correlation between these two IS success dimensions can be found (Ainin, Bahri, & Ahmad, 2012; Al-Debei et al., 2013; Bossen, Jensen, & Udsen, 2013). Thus, in the context of this study, the good quality of information provided by Frog VLE should increase the teachers' satisfaction. Furthermore, System Quality was also found to have a robust positive relationship to User Satisfaction by a number of studies conducted to date (Urbach & Müller, 2012). For example, both empirical studies conducted by Al-Debei et al. (2013), and Aggelidis and Chatzoglou (2012) have found a strong relationship between System Quality and User Satisfaction. Hence, this study assumed that the good quality of Frog VLE that is always available, easy to use and learn, convenient to access and reliable will lead to positive teachers' satisfaction. On the other hand, better service quality is expected to lead to higher user satisfaction as well, at the individual level of analysis (DeLone & McLean, 2003). Hence, this study postulates that if the teachers received the good services by Frog VLE and 1BestariNet, they will likely to feel satisfied and intend to continue using the system. However, empirical examinations by a number of previous studies have shown that Service Quality only had a mixed support for its ability to explain User Satisfaction (Urbach & Müller, 2012). Nevertheless, the literature in the discipline of VLE evaluation, particularly in the Malaysian context, is yet to reveal any attempt to empirically test this relationship. Therefore, considering the preceding discussion, the study proposes the following sub-hypotheses:

*H<sub>5a</sub>: Information Quality has a significant influence on the User Satisfaction of Frog VLE among the teachers.*

*H<sub>5b</sub>: System Quality has a significant influence on the User Satisfaction of Frog VLE among the teachers.*

*H<sub>5c</sub>: Service Quality has a significant influence on the User Satisfaction of Frog VLE among the teachers.*

The updated D&M posits that the positive experience with the initial Use of IS will lead to higher User Satisfaction (DeLone & McLean, 2003). In light of this, the teachers are expected to feel satisfied if they have experienced the positive use of Frog VLE. Empirically, the literature has demonstrated the moderately supported relationship between Use and User Satisfaction (Urbach & Müller, 2012), which requires further investigation. Therefore, based upon this argument, this study proposes the following hypothesis:

*H<sub>6</sub>: Use has a significant influence on the User Satisfaction of Frog VLE among the teachers.*

In addition, the updated D&M also suggest that the Net Benefits will have the correlation to the User Satisfaction. The positive Net Benefits supposed to trigger the positive User Satisfaction and the other way around. In addition, the reversed back effect from Net Benefits to User Satisfaction has shown to be very robust (Urbach & Müller, 2012). Build on the preceding arguments; this study postulates that the positive benefits provided by Frog VLE will increase the teachers' satisfaction with the system itself. Therefore, the following hypothesis is proposed:

*H<sub>7</sub>: Net Benefits has a significant influence on the User Satisfaction of Frog VLE among the teachers.*

The Intention to Use is a measure of the likelihood a person will employ an application (Al-Debei et al., 2013). The concept of people's intention to use certain technology was introduced by Davis (1989) in TAM. This model uses the 'Behavioral Intention to Use' construct as an antecedent to predict the actual use of the specific technology. This positive use will later cause satisfaction and intention for future use and so on. Based on this premises, Mardiana et al. (2015) also suggest that the Intention to Use should be the predictor of Use in D&M. Moreover, this relationship between Intention to Use and Use has been supported by a number of empirical studies (Al-Debei et al., 2013; C.-W. D. Chen & Cheng, 2009; Mohammadi, 2015). Based on the preceding discussion, the study hypothesizes that the teachers' intention to use Frog VLE in the future will positively influence its actual usage. Therefore, the following hypothesis is proposed:

*H<sub>8</sub>: Intention to Use has a significant influence on the Use of Frog VLE among the teachers.*

DeLone and McLean (2003) suggested that certain net benefits would occur when the user used the particular IS. Hence, this study hypothesizes that the teachers will capture some benefits in terms of time-saving, improved productivity and personal valuation when they use the Frog VLE. Empirically, the relationship between these two IS Success dimensions was found to be moderately supported (Petter, DeLone, & McLean, 2008). Considering the inconsistency in the previous findings, this study believes that the further investigation is required. Therefore, the following hypothesis is proposed:

*H<sub>9</sub>: Use has a significant influence on the Net Benefits of Frog VLE among the teachers.*



Meanwhile, certain Net Benefits will occur as a result of Use and User Satisfaction (DeLone & McLean, 2003). On the practical basis, the teachers who are satisfied with the Frog VLE should believe that they would save time, improve productivity and increase their personal value when using it. A review of the current state of research on D&M by Urbach and Müller (2012) has shown that the relationship of User Satisfaction and Net Benefits was strongly supported by the previous empirical studies including those conducted by prominent researchers such as Iivari (2005) and Halawi et al. (2008). Considering these findings, this study also expects the similar outcome, and hence proposes the following hypothesis:

*H<sub>10</sub>: User Satisfaction has a significant influence on the Net Benefits of Frog VLE among the teachers.*

As discussed earlier, DeLone and McLean (2003) suggested that the good experience with the initial Use of Frog VLE is expected to cause the positive User Satisfaction, and further lead to increase in Intention to Use. In this sense, the positive relationship between Use and Intention to Use should merely exist with the mediating effect of User Satisfaction. In other words, the teachers (who have already experienced the initial use) are assumed to develop an intention for future use, only if they were satisfied with the initial use of Frog VLE. Therefore, this study proposes the following hypothesis:

*H<sub>11</sub>: User Satisfaction mediates the relationship between Use and Intention to Use of Frog VLE among the teachers.*

In this study, the Personal Characteristics, which consist of Age, Gender and Frog VLE Experience, are posited to play the moderating role within the relationship between Quality Dimensions (Information Quality, System Quality and Service Quality) and Intention to Use (Intention to Use). Therefore, the following main hypothesis is proposed. The next paragraphs will thoroughly discuss the antecedents of this main hypothesis.

*H<sub>12</sub>: Personal Characteristics moderates the relationship between Quality Dimensions and Intention to Use of Frog VLE among the teachers.*

During the past 50 years, much more evidence has become available regarding the effect of age toward IS adoption, especially in the context of intention to use the technology (Lin, Lu, & Liu, 2013; R. N. Taylor, 1975; Venkatesh, Morris, Davis, & Davis, 2003). Some researchers suggest that the age reflects the variation of human capability in processing information that further interferes in their reaction toward the IS (Venkatesh et al., 2012). Compared to the younger people, the older people are found to rely more on automatic information processing (Jennings & Jacoby, 1993), and therefore, require the better quality of information. Moreover, the increased age will usually cause the difficulty in processing complex information and to stay in focus on the job, which both are necessary for IS adoption (Venkatesh et al., 2003). Hence, the older teacher is expected to feel less interested in using Frog VLE if they found that the information and system quality is low.

In the context of IS usage, the previous studies have explained that the aged worker tends to require more assistance and help in performing the job, which is usually caused by the physical and cognitive limitation associated to the aging process (Venkatesh et al., 2003). Under those circumstances, the aged IS user is believed to face greater obstacles in processing the new and complex information that will further affect their ability to learn the recent technologies (Morris, Venkatesh, & Ackerman, 2005). As a result, they tend to rely

more on the finer support and service quality to perform a certain task (Venkatesh et al., 2012). Therefore, this study posits that the older teachers will require better information, system and service quality from Frog VLE in order to integrate it into their teaching activities. This assumption is supported by a number of empirical studies that demonstrated the effect of teachers' age toward the ICT usage in schools (Hindman, 2000; Johari & Siti Norazlina, 2010; Raman & Yamat, 2014). Based on the preceding discussion, this study postulates that the older teachers will demand higher information, system and service quality by Frog VLE and 1BestariNet. Therefore, the following sub-hypotheses are proposed:

*H<sub>12a</sub>: Age moderates the relationship between Information Quality and Intention to Use of Frog VLE among the teachers.*

*H<sub>12b</sub>: Age moderates the relationship between System Quality and Intention to Use of Frog VLE among the teachers.*

*H<sub>12c</sub>: Age moderates the relationship between Service Quality and Intention to Use of Frog VLE among the teachers.*

Meanwhile, the empirical evidence shows that perceived usefulness (one of the measurements for information quality) was more salient for men compared with the women (Venkatesh & Morris, 2000; Venkatesh et al., 2003). Men are commonly task-oriented, and thus the desired quality of information is important to perform a certain task at hand (Venkatesh et al., 2003), such as in this case, for teaching. On the other hand, women are found to be more sensitive and detailed especially in making decisions (Meyers-Levy & Tybout, 1989). This is primarily because they often tend to process every element of information in a structured manner, while men are most likely to ignore some relevant details and process the information from a broader perspective (Meyers-Levy & Maheswaran, 1991). In light of this Venkatesh et al. (2012) suggested that the women would be more sensitive to changes within the environment that will further affect their intention. This notion was also supported by a number of empirical IS studies that uncover the greater effect of perceive ease of use (one of the measurements for system quality) among the women (Venkatesh & Morris, 2000; Venkatesh et al., 2003). This evidence suggested that women would expect better system quality which is easy to use (Venkatesh et al., 2003) and henceforth if they perceived that the particular system is difficult to use, they will most likely demand the finer service quality.

Indeed, the factors of age and gender are closely related to each other and should be examined together (Levy, 1988). Gender differences and the dependence on service quality will become more salient with the increasing age (Morris et al., 2005). As the human being getting older, the distinction in the gender roles will become more compelling and women are generally will place more reliance on better external support or service quality (Venkatesh et al., 2012). In summary, the previous discussion of the gender roles has demonstrated that the intention to use Frog VLE among the teachers will most likely be influenced by the gender differences. Male teachers are expected to demand better information quality, while female teachers will mostly be influenced by the system and service quality. Based on the preceding consideration, this study, therefore, proposes the following sub-hypotheses:

*H<sub>12d</sub>: Gender moderates the relationship between Information Quality and Intention to Use of Frog VLE among the teachers.*

*H<sub>12e</sub>: Gender moderates the relationship between System Quality and Intention to Use of Frog VLE among the teachers.*

*H<sub>12f</sub>: Gender moderates the relationship between Service Quality and Intention to Use of Frog VLE among the teachers.*

Experience as suggested in Unified Theory of Acceptance and Use of Technology (UTAUT) and Consumer Acceptance and Use of Technology (UTAUT 2) refers to “an opportunity to use a target technology and is typically operationalized as the passage of time from the initial use of a technology by an individual” (Venkatesh et al., 2012). Hence, in this study, it is referred to the teachers’ experience with the Frog VLE. Frog VLE experience can also moderates the relationship between Service Quality and Intention to Use, as suggested by Venkatesh et al. (2012). By referring to the ground-breaking studies conducted by Alba and Hutchinson (1987) and Venkatesh et al. (2012), the greater experience is expected to lead to better familiarity with the specific system and thus reducing the reliance to the external supports.

Even though the factors of age and gender are found to be influential in the previous studies, the effects of these factors were also expected to decrease with the increasing of experience (Venkatesh et al., 2003). To elaborate, gender differences in learning new technologies will usually increase in parallel with age (Venkatesh et al., 2012) and the aging process will cause the declining in information processing ability. As the men are most likely will process information based on their preceding experience, the older women tend to process the information in a more detailed and cautious manner (Venkatesh et al., 2012). In this sense, the older women are expected to be less influenced by their heuristic experience. In one prominent study to determine the role of prior experience, perceived usefulness is found to be more pronounced with increasing experience, that is the IS user will psychologically believe that the information provided by the particular IS is useful to them as they are getting familiar with it (S. Taylor & Todd, 1995). This finding proved that the role of prior experience is crucial in the context of IS usage, particularly to determine the strength of the relationship between information quality and intention to use.

Additionally, the perceived complexity should also decrease as the ease of use will turn to be more pronounced with the increasing experience (Davis, 1989; Szajna, 1996; Thompson, Higgins, & Howell, 1994). In comparison, the dependency to the external support is usually more noticeable for the less experienced people (Thompson et al., 1994). Similarly, the experience can also be a moderator between service quality and intention to use because the increasing familiarity to the IS will enhance the user’s knowledge structure that will assist the learning process, and hence reducing the dependency to the external support or services (Alba & Hutchinson, 1987; Venkatesh et al., 2012).

Besides, the dependency on the service quality is more noticeable to the older woman in the early stage of technology adoption (less experience) since they are most of the time put to the effort of learning the new technology (Venkatesh et al., 2012). In the context of this study, the effect of quality dimensions is expected to be moderated by Frog VLE experience. Likewise, the effect of these personal quality dimensions will gradually become lesser as the teachers getting familiar to the system. The greater Frog VLE experience by the teachers should positively increase the familiarity and finally should lead to decreasing of dependency on external support, particularly from 1BestariNet helpdesk services. Therefore, the following sub-hypotheses are proposed:

*H<sub>12g</sub>: Frog VLE Experience moderates the relationship between Information Quality and Intention to Use of Frog VLE among the teachers.*

*H<sub>12h</sub>: Frog VLE Experience moderates the relationship between System Quality and Intention to Use of Frog VLE among the teachers.*

*H<sub>12i</sub>: Frog VLE Experience moderates the relationship between Service Quality and Intention to Use of Frog VLE among the teachers.*

A report produced by Association of School and College Leaders (2014) has defined Workload as “Work done for perceived and/or unnecessary compliance processes, which take teachers away from the complex process of teaching and learning.” In addition, it is also related to the teachers’ professional duties and responsibilities such as teaching, community services, career development and interaction with students (Yuker, 1984). In the context of VLE implementation, it is considered as one of the factors that possibly influenced the utilization of the particular system. The issue of excessive workload has been acknowledged by many previous researchers, particularly in the field of ICT in education (Cheok & Wong, 2016; Johari & Siti Norazlina, 2010; Wu et al., 2010). Unfortunately, the empirical evidence is still rare to be found regarding the issue, especially in Malaysia.

For instance, Hu, Clark, and Ma (2003) suggested that workload can severely hinder the teachers from adopting the technology. Accordingly, the case study by Cheok and Wong (2016) found that workload is one of the major influences that interferes in their predetermination to use Frog VLE, even though they are aware of those particular benefits. Since the last century, the task of teachers has rapidly grown and the complaints of heavy workload had become common among them (Ballet & Kelchtermans, 2009). In light of this, Inan and Lowther (2009) suggested that the future research on ICT integration in education should include the factor of workload, as they believed that it will extend the explanations from the existing literature. Also, the similar issue of workload has also become the concerns for several other IS researchers in Malaysia, which requires further explanations and more empirical evidence (Anuar & Mohd Nordin, 2015; Johari & Siti Norazlina, 2010; Norazilawati et al., 2013).

Based on the preceding discussion, this study postulates that workload will negatively moderate two relationships, namely; Net Benefits to Intention to Use and Intention to Use to Use of Frog VLE among the teachers. The teachers with the higher workload are expected to have lower intention to use Frog VLE even though they are agreed that Frog VLE provides benefits to them, while at the same time should negatively influence the usage. Thus, the following hypothesis is presented:

*H<sub>13</sub>: Workload moderates the relationship between Net Benefits and Intention to Use of Frog VLE among the teachers.*

*H<sub>14</sub>: Workload moderates the relationship between Intention to Use and Use of Frog VLE among the teachers.*

## **Methodology**

A cross-sectional survey field study will be employed in this study, as the data will be collected at a single point in time. Applying a survey method is believed to be the most

appropriate to choose because it is an accurate means to gather information as well as enable the researchers to generalize the findings, from the sample to a population (Creswell, 2014). This method is also suitable for a research with the large sample size, as the survey is quick, cheap and efficient to administer (Sekaran, 2003). Finally, a survey is appropriate when asking the respondents about their thought, opinions, and feelings (Shaughnessy, Zechmeister, & Zechmeister, 2012).

### ***Sampling***

This study will use the probability sampling method to reduce the bias and increase the generalizability of the findings. Table 1 summarizes the sampling design of this study. The simple random sampling will be used. Based on the predetermined sample size required for this study, 45 the schools will be selected from sampling frame using the random calculator. From each selected school, 10 teachers will be chosen as respondents, using ‘fishbowl draw sampling’ technique. This will total up to approximately 450 of sample size ( $45 \times 10 = 450$ ).

**Table 1: Sampling Design of the Study**

<b>Concept</b>	<b>The Current Study</b>
<b>The Theoretical Population</b>	The teachers throughout Malaysia.
<b>The Study Population</b>	The teachers in the Northern Region of Malaysia.
<b>Sampling Frame</b>	List of schools in the Northern Region of Malaysia.
<b>The Sample</b>	450 teachers

### ***Instrument Design***

This study has systematically developed the questionnaire that meets the research objectives based on the proposed Conceptual Model. The questionnaire is divided into three sections; A, B, and C. Section A aims to gather the demographic data of the respondents. Section B is purposely designed to measure the eight constructs, namely Information Quality, System Quality, Service Quality, Intention to Use, Use, User Satisfaction, Workload, and Net Benefits. Respondents are asked to circle the appropriate response. In addition, an introductory statement for every construct of the research model has been included in the questionnaire. For the purpose of validation, experts in the study field have revised the formulation of these statements before conducting the pilot study. The content validation was done by seven experts in IS, ICT in education and E-Learning using Content Validity Index (CVI). Furthermore, the face validation was done in two stages. The first stage involved the instrument’s revision by one language expert, three experts in IS and two statisticians. In the second stage, the instrument was pre-tested by 16 respondents, which comprises of rural and urban teachers. As a result, a validated instrument to measure VLE success among the teachers has been produced, which is ready to be applied in the real study.

For every construct, the measurement scale is a seven-point Likert Scale, which ranges from 1 to 7 [‘1’ Extremely Disagree to ‘7’ Extremely Agree]. This study chooses to apply the seven-point Likert Scale because it provides more widely spread scale values compared to five-point Likert Scale and thus reduces the possibility of respondent’s bias - by just selecting a neutral value (Dwivedi, Papazafeiropoulou, Brinkman, & Lal, 2010). In fact, the seven-point Likert Scale has also been applied by many prominent researchers in the IS discipline (Agarwal & Prasad, 1997; Armstrong, Brooks, & Riemenschneider, 2015; Seddon

& Kiew, 1996; Venkatesh et al., 2012). Table 2 presents the validated measurements for each continuous construct in this study.

**Table 2: Measurement of Continuous Constructs**

<b>Construct/Items</b>
<p><b>Information Quality:</b></p> <ol style="list-style-type: none"> <li>1. The Frog VLE provides information that is exactly what I need.</li> <li>2. The Frog VLE provides information that is relevant to teaching.</li> <li>3. The Frog VLE provides sufficient information.</li> <li>4. The Frog VLE provides information that is easy to understand.</li> <li>5. The Frog VLE provides up-to-date information.</li> <li>6. Through Frog VLE, I get the information I need in time.</li> <li>7. Information provided by Frog VLE is reliable.</li> </ol>
<p><b>System Quality:</b></p> <ol style="list-style-type: none"> <li>1. The Frog VLE is always available.</li> <li>2. The Frog VLE is user-friendly.</li> <li>3. The Frog VLE has attractive features that appeal to me.</li> <li>4. The Frog VLE enables me to accomplish task quicker.</li> <li>5. The Frog VLE is easy to navigate.</li> <li>6. The Frog VLE provides high-speed information access.</li> <li>7. The Frog VLE functions accurately most of the time.</li> </ol>
<p><b>Service Quality:</b></p> <ol style="list-style-type: none"> <li>1. The Frog VLE helpdesk is prompt in responding to my queries.</li> <li>2. The Frog VLE helpdesk is available in case I have a technical problem.</li> <li>3. The Frog VLE helpdesk is willing to help whenever I need support.</li> <li>4. The Frog VLE helpdesk gives users individual attention.</li> <li>5. The Frog VLE helpdesk is highly knowledgeable.</li> <li>6. The Frog VLE helpdesk dedicates enough time to resolve my specific technical concerns.</li> <li>7. The helpdesk shows a sincere interest in solving technical problems related to Frog VLE.</li> <li>8. The Frog VLE has up-to-date equipment.</li> <li>9. The Frog VLE's physical facilities are visually appealing.</li> </ol>
<p><b>Intention to Use:</b></p> <ol style="list-style-type: none"> <li>1. I intend to continue using the Frog VLE.</li> <li>2. I will regularly use the Frog VLE in the future.</li> <li>3. Assuming that I have access to the Frog VLE, I intend to use it.</li> <li>4. I intend to be a heavy user of Frog VLE.</li> </ol>
<p><b>Use:</b></p> <ol style="list-style-type: none"> <li>1. I frequently use the Frog VLE.</li> <li>2. I use the Frog VLE whenever appropriate.</li> <li>3. I use Frog VLE voluntarily.</li> <li>4. I use Frog VLE for teaching.</li> <li>5. I use Frog VLE to give tests to my students.</li> <li>6. I use Frog VLE to communicate with students.</li> <li>7. I use Frog VLE to collaborate with other teachers.</li> <li>8. I use Frog VLE to retrieve educational information.</li> <li>9. I use Frog VLE to retrieve teaching resources.</li> </ol>
<p><b>User Satisfaction:</b></p> <ol style="list-style-type: none"> <li>1. I feel contented using Frog VLE.</li> <li>2. I feel pleased using Frog VLE.</li> <li>3. I think the Frog VLE is very helpful.</li> <li>4. I think the Frog VLE is successful.</li> </ol>

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**Net Benefits:**

1. The Frog VLE is time-saving.
2. The Frog VLE enhances my teaching skills.
3. The Frog VLE helps me improve my job performance.
4. The Frog VLE empowers me.
5. The Frog VLE contributes to my career success.

**Workload:**

1. The pace in my job is too fast.
  2. My job is too demanding.
  3. My job is very hectic.
  4. I have too much work to do on the job.
  5. I will have to learn new teaching strategies in order to use Frog VLE.
  6. The use of Frog VLE will increase my workload.
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***Data Analysis Procedure***

The data analysis process will be conducted in two phases. In the first phase, IBM SPSS Statistics (SPSS) will be used for data entry, screening, and preparation, for the purpose of identifying missing and non-compliance data before starting the main analysis. Finally, in the second phase, Structural Equation Modelling (SEM) will be used for hypotheses and model testing. In addition, the Confirmatory Factor Analysis (CFA) will be conducted during this stage to confirm the factor structure extracted previously during Exploratory Factor Analysis (EFA). According to Hair, Ringle, and Sarstedt (2011), SEM is an appropriate multivariate method to test the complete theories and concepts. Moreover, it enables the researcher to conduct systematic and comprehensive testing of the interlinked variables and their items in just a single run (Gefen, Straub, & Boudreau, 2000).

**Conclusion**

This paper has presented the initial stage of the study which comprises of introduction, objectives, literature review, conceptual framework and research methodology that will be employed. From the literature analysis, the research issues and the gaps have been identified. Building on this, a research conceptual framework is developed to evaluate the Frog VLE success among Malaysian teachers. Furthermore, this study will be beneficial to the researchers in both domains, IS, and education by contributing in the following ways. First, this study will examine the applicability of D&M Model to evaluate the success of Frog VLE implementation. Second, this study will extend the D&M Model, by testing the role of Workload as the moderating variable between two relationships namely, Net Benefits and Intention to Use (IV) to the Use (DV) of the Frog VLE. By examining these moderating effects, the study aims to improve the explanation power D&M in the context of LMS implementation. Third, this study will also examine three Personal Characteristics as moderating variables, namely Age, Gender and Frog VLE Experience to the updated D&M. The body of literature thus far only calibrated to the assessment of the existing constructs or with the inclusion of certain external independent variables to fits the issues at hand. Nevertheless, the studies that examine the moderating effects of these personal characteristics are surprisingly scarce in D&M based literature, even though it has been empirically proved in other models like UTAUT and UTAUT 2. Finally, this study will use both constructs of Intention to Use and Use. Although Intention to Use is introduced as an alternative for Use, this study posits that both of these constructs are significant, especially to capture the issue of continuous usage.

In conclusion, this study aims to fill the gap as none of the existing studies to the

knowledge of the researcher provides the determinants of Frog VLE success. The successful implementation of VLE relies upon its ability to meet the users' requirement and expectation, while at the same time provide the net benefits for its users, regardless of the location, urban and rural. Thus, the outcome from the study will provide the guidelines and evidence for Malaysian policymakers, especially the MOE to spot the weaknesses in the current practice of Frog VLE, for future improvement, as well as to justify their investment.

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