IMPLEMENTATION EVALUATION MODEL TO MEASURE VIRTUAL LEARNING ENVIRONMENT SUCCESS FACTORS AMONG MALAYSIAN TEACHERS

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Abstrak

Walaupun pelbagai faedah ditawarkan oleh Persekitaran Pembelajaran Maya (VLE), kadar penggunaannya di kalangan guru-guru Malaysia masih rendah, yang menunjukkan bahawa sistem ini terdedah kepada risiko kegagalan. Oleh itu, kajian ini dijalankan untuk membangunkan model bagi mengukur kejayaan VLE di kalangan guru Malaysia berdasarkan kepada Model Kejayaan Sistem Maklumat DeLone & McLean yang dikemaskini (D&M). Kajian ini menggunakan reka bentuk *Explanatory Sequential Mixed Methods*. Lapan ratus lima puluh (850) soal selidik telah diedarkan kepada responden di wilayah utara Malaysia menggunakan prosedur persampelan rawak mudah. Kod QR telah digunakan untuk mempercepatkan proses kutipan data tanpa melanggar syarat persampelan berkebarangkalian. Hasilnya, 719 borang soal selidik telah dikembalikan dan 643 boleh diguna pakai untuk analisis utama. Analisis data kuantitatif dilakukan menggunakan *Partial Least Squares-Structural Equation Modeling* (PLS-SEM). Kebanyakan hipotesis hubungan langsung telah disokong, kecuali Penggunaan kepada Niat Penggunaan, yang didapati diantarakan sepenuhnya oleh Kepuasan Pengguna. Di samping itu, hasil kajian juga mengesahkan peranan Beban Kerja sebagai penyederhana. Walau bagaimanapun, kesan penyederhanaan Ciri Peribadi tidak disokong. Seterusnya, isu hubungan rekursif yang menghasilkan dua nilai R^2 dan Q^2 dalam pembolehubah endogen tertentu telah disiasat dengan membandingkan lima model yang mungkin. Hasilnya, model akhir yang dihasilkan dapat dianalisis dalam satu model struktur dan oleh itu, memberikan nilai ramalan ketepatan dan ramalan kerelevanan yang sah. Berdasarkan model ini, strategi pelaksanaan VLE telah dihasilkan dan dibentangkan kepada 14 orang pengamal pendidikan. Selanjutnya, pengesahan dilakukan menggunakan analisis kandungan kualitatif. Hasil analisis menunujukkan bahawa strategi pelaksanaan ini sesuai dilaksanakan di sekolah-sekolah Malaysia. Keseluruhannya, kajian ini menyumbang kepada ilmu pengetahuan dengan menyediakan model untuk mengukur kejayaan VLE di kalangan guru.

Kata kunci: Model Kejayaan Sistem Maklumat DeLone & McLean, E-Pembelajaran, Frog VLE, Persekitaran Pembelajaran Maya, Model Kejayaan VLE

Abstract

Despite the various benefits offered by Virtual Learning Environment (VLE), its usage among Malaysian teachers is still low, indicating that the system is not in the right track of success. Therefore, this study aims to develop a model to measure VLE success among Malaysian teachers based on the updated DeLone & McLean IS Success Model (D&M). This study employed an explanatory sequential mixed method design. Eight hundred and fifty (850) questionnaires were distributed to respondents across the northern region of Malaysia using simple random sampling procedure. The QR code was used to speed up the data collection without violating the rules of probability sampling. As a result, 719 questionnaires were returned and 643 are usable for the main analysis. The quantitative data analysis was conducted using Partial Least Squares-Structural Equation Modeling (PLS-SEM). Most of hypothesized direct relationships are supported, except for Use to Intention to Use, which is fully mediated by User Satisfaction. The result also confirmed the positive moderating role of Workload. However, the moderating role of Personal Characteristics is not supported. Furthermore, the issue of recursive relationships, which produced two R^2 and Q^2 in certain endogenous variables, was investigated by comparing five possible models. Consequently, the produced model can be analyzed on a single structural model and therefore, provides valid predictive accuracy and relevance. This analysis has become a major methodological contribution of the study that provides a foundation for further investigations on the relevancy of the recursive relationships in D&M. Based on the final model, the VLE implementation strategy was produced and presented to 14 practitioners. Next, the validation was done using qualitative content analysis. The result indicates that the implementation strategy can be applied in Malaysian schools. Finally, this study contributes to the body of knowledge by providing a model to measure VLE success among teachers.

Keywords: DeLone & McLean IS Success Model, E-Learning, Frog VLE, Virtual Learning Environment, VLE Success Model

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List of Abbreviations

ANOVA	Analysis of Variance
APDM	Aplikasi Pangkalan Data Murid
AVE	Average Variance Extracted
BPSH	Bahagian Pengurusan Sekolah Harian
CB-SEM	Covariance Based-Structural Equation Modeling
CFA	Confirmatory Factor Analysis
CMV	Common Method Variance
CR	Composite Reliability
CVI	Content Validity Index
D&M	DeLone & McLean IS Success Model
DOI	Diffusion of Innovation
DV	Dependent Variables
EFA	Exploratory Factor Analysis
EIS	Educational Information Systems
EMIS	Education Management Information System
EPRD	Educational Planning and Research Division
ETM	Educational Technology Evaluation Model
f^2	Effect Size (R-Squre)
HTMT	Heterotrait Monotrait Ratio
ICT	Information and Communication Technology
IQ	Information Quality
IS	Information Systems
ISD	Information System Development
IT	Information Technology
ITU	Intention to Use
IV	Independent Variables
JPN	Jabatan Pelajaran Negeri
KMO	Kaiser-Meyer-Olkin Test
KMS	Knowledge Management Systems
KPI	Key Performance Indicator
LMS	Learning Management System(s)
MOE	Ministry of Education, Malaysia
NB	Net Benefits
OLS	Ordinary Least Square
PLC	Project Life Cycle
PLS-MGA	PLS-Multi Group Analysis
PLS-SEM	Partial Least Squares-Structural Equation Modeling
PPD	Pejabat Pendidikan Daerah

PPDCH	Pejabat Pendidikan Daerah Cameron Highlands
q^2	Effect Size (Q-Square)
Q^2	Predictive Relevance
R^2	Coefficient of Determination
SD	Standard Deviation
SDLC	System Development Life Cycle
SEM	Structural Equation Modeling
SeQ	Service Quality
SK	Sekolah Kebangsaan
SLR	Systematic Literature Review
SMK	Sekolah Menengah Kebangsaan
SMM	Sistem Maklumat Murid
SPS	Sistem Pengurusan Sekolah
SPSS	IBM SPSS Statistics
β	Path Coefficient
SyQ	System Quality
TALIS	Teaching and Learning International Survey
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Actions
U	Use
US	User Satisfaction
UTAUT	Unified Theory of Acceptance and Use of Technology
UUM	Universiti Utara Malaysia
VIF	Variance Inflation Factor
VLE	Virtual Learning Environment
WL	Workload
X^2	Chi-Square
z-score	Standardize Score
α	Cronbach's Alpha
√AVE	Square-Root of AVE

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

In the last few decades, Information and Communication Technology (ICT) bombardment has shown significant impacts in every aspect of human daily lives (Livingstone, 2012). The advancement of ICT hardware and software has enabled humans to communicate with each other regardless of time and locations. Accordingly, it also has a significant effect in various fields, including education (Player-Koro, 2012). The past decade has seen the rapid changes in teaching and learning practices, precipitated by the integration of ICT into education (Ghavifekr et al., 2014). Recently, many countries have rapidly progressed in terms of infrastructures, support mechanisms and aligning ICT policy with educational vision (Hinostroza, 2018). This has resulted in a successful implementation of educational ICT initiatives in many modern countries, for example the United States of America, Australia and Japan (A. I. Khan, Al-Shihi, Al-Khanjari, & Sarrab, 2015).

Notwithstanding, most of developing countries are still out of the race, indicated by the low usage of ICT especially among teachers (Cheok, Wong, & Ahmad Fauzi Ayub, 2017; Ibieta, Hinostroza, Labbé, & Claro, 2017; Rolando, Salvador, & Luz, 2013). Issues such as inadequate ICT facilities and support, lack of ICT readiness as well as the heavy workload carried by teachers are among the commonly heard factors that contribute to the low ICT usage in schools (Cheok & Wong, 2016; Copriady, 2015; Kihoza, Zlotnikova, Bada, & Kalegele, 2016; Solar, Sabattin, & Parada, 2013; Surif,

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APPENDICES

Appendix A

Questionnaire

Tarikh : _____

Nama Sekolah : _____

No Soal Selidik

Pusat Pengajian Pengkomputeran
UNIVERSITI UTARA MALAYSIA

Tajuk Kajian: Model Penilaian Pasca-Pelaksanaan untuk Mengukur Kejayaan Frog VLE di Kalangan Guru-Guru Malaysia.

Responden yang dihormati,

Saya adalah pelajar ijazah kedoktoran dari Pusat Pengajian Pengkomputeran, UUM. Soal selidik ini dibina untuk mengukur kejayaan Frog VLE di kalangan guru-guru Malaysia. Di Malaysia, Frog VLE boleh dicapai di semua sekolah dalam negara hasil daripada inisiatif 1BestariNet. Frog VLE adalah persekitaran pembelajaran maya yang direka untuk memudahkan dan menambah baik pengajaran dan pembelajaran, serta komunikasi dan pentadbiran. Saya amat berbesar hati sekiranya tuan/puan sudi memperuntukkan sedikit masa dan fikiran untuk menjawab soal selidik ini. Jawapan tuan/puan adalah sulit dan hanya akan digunakan untuk tujuan kajian sahaja. Jawapan yang diberikan tidak akan ada yang betul atau salah. Untuk makluman, dengan mengisi soal selidik ini, tuan/puan akan membantu untuk menambah baik pelaksanaan Frog VLE. Terima kasih atas kesudian tuan/puan untuk turut serta dalam kajian ini.

Yang Benar,

Hapini Bin Awang
Universiti Utara Malaysia (UUM), 06010 Sintok, Kedah, Malaysia.
012-5891300, *hapini_awang@ahsgs.uum.edu.my*, *hapiniawang@gmail.com*

*S*oal selidik ini mengandungi empat bahagian (7 muka surat). **Bahagian A** mengandungi soalan berkaitan latar belakang anda. **Bahagian B** disediakan dalam dwi bahasa (Bahasa Melayu dan Inggeris), mengandungi pernyataan berkaitan Kualiti Maklumat, Kualiti Sistem, Kualiti Perkhidmatan, Keinginan untuk Guna, Penggunaan, Kepuasan Pengguna, Faedah Bersih Frog VLE dan Beban Kerja. **Bahagian C** mengandungi empat soalan tambahan berkaitan pelaksanaan Frog VLE. **Bahagian D** mengandungi dua soalan terbuka untuk mereka yang tidak pernah menggunakan Frog VLE.

Sebagai alternatif, anda juga boleh menjawab secara atas talian dengan mengimbas Kod QR di sebelah pada telefon bimbit, atau layari laman https://goo.gl/forms/JeEYTCbXsT7NQooy2

Bahagian A: Maklumat Peribadi

Kami ingin mendapatkan sedikit maklumat peribadi anda untuk lebih memahami pandangan anda berkaitan Frog VLE. Sila tandakan (✓) pada bulatan yang berkaitan.

A1. Umur: _____ Tahun

A2. Jantina: 1. Perempuan ○ 2. Lelaki ○

A3. Kelayakan akademik tertinggi:
1. Diploma ○ 2. Sarjana Muda ○ 3. Sarjana ○ 4. PhD ○

A4. Pengalaman mengajar:
1. ≤ 1 Tahun ○ 2. 2-4 Tahun ○ 3. 5-7 Tahun ○
4. 8-10 Tahun ○ 5. 11-13 Tahun ○ 4. ≥ 14 Tahun ○

A5. Bilangan waktu mengajar seminggu:
1. ≤ 10 Waktu ○ 2. 11-15 Waktu ○ 3. 16-20 Waktu ○
4. 21-25 Waktu ○ 5. 26-30 Waktu ○ 6. ≥ 31 Waktu ○

A6. Berapa jam biasanya anda peruntukkan untuk tugas akademik dalam seminggu? (contoh: persedian mengajar, menanda, refleksi, penilaian dan lain-lain)
1. 3 Jam ○ 2. 4-6 Jam ○ 3. 7-9 Jam ○
4. 10-12 Jam ○ 5. 13-15 Jam ○ 6. ≥ 16 Jam ○

A7. Berapa jam biasanya anda peruntukkan untuk tugas-tugas selain mengajar dalam seminggu? (contoh: tugas pentadbiran, ko-kurikulum, pengurusan murid dan lain-lain)
1. ≤ 3 Jam ○ 2. 4-6 Jam ○ 3. 7-9 Jam ○
4. 10-12 Jam ○ 5. 13-15 Jam ○ 6. ≥ 16 Jam ○

A8. Berapa kali anda menggunakan Frog VLE dalam sebulan?
1. Langsung tidak menggunakan ○ 2. Kira-kira sekali ○ 3. 2-4 kali ○
4. 5-7 kali ○ 5. 8-10 kali ○ 6. 11 kali atau lebih ○

A9. ** Pengalaman menggunakan Frog VLE:

1. Tiada ○ } ** *Terus ke Bahagian D, tanpa perlu menjawab Bahagian B & C.*

2. ≤ 1 Tahun ○ 3. 2 Tahun ○ 4. 3 Tahun ○
5. 4 Tahun ○ 6. 5 Tahun ○ 7. ≥ 6 Tahun ○ } ** *Sila ke Bahagian B, dan seterusnya ke Bahagian C.*

Nota: Sekiranya jawapan anda adalah **'Tiada', Sila terus ke **Bahagian D**. Jika anda memilih jawapan lain, sila ke **Bahagian B** & **C**.*

Bahagian B: Dimensi Kejayaan Frog VLE

Kami ingin mengetahui pandangan anda tentang faktor-faktor yang mempengaruhi Penggunaan, Kepuasan Pengguna dan Faedah Frog VLE di kalangan guru-guru Malaysia. Soalan di bahagian ini disediakan dalam dwi bahasa.

Sila bulatkan nombor yang sesuai berdasarkan skala di bawah:

1---------- 7

Sangat Tidak Setuju ***Sangat Setuju***

1.0 – KUALITI MAKLUMAT (IQ)	**Tahap Persetujuan**
1. Frog VLE memberikan maklumat sepertimana yang saya kehendaki. *The Frog VLE provides information that is exactly what I need.*	**1 2 3 4 5 6 7**
2. Frog VLE memberikan maklumat yang berguna untuk pengajaran. *The Frog VLE provides information that is relevant to teaching.*	**1 2 3 4 5 6 7**
3. Frog VLE memberikan maklumat yang mencukupi. *The Frog VLE provides sufficient information.*	**1 2 3 4 5 6 7**
4. Frog VLE memberikan maklumat yang mudah difahami. *The Frog VLE provides information that is easy to understand.*	**1 2 3 4 5 6 7**
5. Frog VLE menyediakan maklumat yang terkini. *The Frog VLE provides up-to-date information.*	**1 2 3 4 5 6 7**
6. Melalui Frog VLE, saya memperolehi maklumat pada masa yang diperlukan. *Through Frog VLE, I get the information I need in time.*	**1 2 3 4 5 6 7**
7. Maklumat yang disediakan oleh Frog VLE boleh dipercayai. *Information provided by Frog VLE is reliable.*	**1 2 3 4 5 6 7**

2.0 – KUALITI SISTEM (SyQ)	**Tahap Persetujuan**
1. Frog VLE sentiasa tersedia. *The Frog VLE is always available.*	**1 2 3 4 5 6 7**
2. Frog VLE adalah mesra pengguna. *The Frog VLE is user-friendly.*	**1 2 3 4 5 6 7**
3. Frog VLE mempunyai ciri-ciri yang menarik bagi saya. *The Frog VLE has attractive features that appeal to me.*	**1 2 3 4 5 6 7**
4. Frog VLE membolehkan saya menyelesaikan tugas dengan lebih cepat. *The Frog VLE enables me to accomplish task quicker.*	**1 2 3 4 5 6 7**
5. Frog VLE mudah dilayari. *The Frog VLE is easy to navigate.*	**1 2 3 4 5 6 7**
6. Frog VLE menyediakan capaian maklumat yang pantas. *The Frog VLE provides high-speed information access.*	**1 2 3 4 5 6 7**
7. Frog VLE berfungsi dengan tepat pada kebanyakan masa. *The Frog VLE functions accurately most of the time.*	**1 2 3 4 5 6 7**

Sila bulatkan nombor yang sesuai berdasarkan skala di bawah:

1---------- **7**

Sangat Tidak Setuju ***Sangat Setuju***

3.0 – KUALITI PERKHIDMATAN (SeQ)	**Tahap Persetujuan**
1. Meja bantuan Frog VLE memberi respon segera terhadap pertanyaan saya. *The Frog VLE helpdesk is prompt in responding to my queries.*	**1 2 3 4 5 6 7**
2. Meja bantuan Frog VLE sentiasa tersedia sekiranya saya menghadapi masalah teknikal. *The Frog VLE helpdesk is available in case I have a technical problem.*	**1 2 3 4 5 6 7**
3. Meja bantuan Frog VLE sudi membantu sekiranya saya memerlukan sokongan pada bila-bila masa. *The Frog VLE helpdesk is willing to help whenever I need support.*	**1 2 3 4 5 6 7**
4. Meja bantuan Frog VLE memberikan perhatian individu kepada pengguna. *The Frog VLE helpdesk gives users individual attention.*	**1 2 3 4 5 6 7**
5. Meja bantuan Frog VLE adalah sangat berpengetahuan. *The Frog VLE helpdesk is highly knowledgeable.*	**1 2 3 4 5 6 7**
6. Meja bantuan Frog VLE memperuntukkan masa yang mencukupi untuk menyelesaikan permasalahan teknikal saya. *The Frog VLE helpdesk dedicates enough time to resolve my specific technical concerns.*	**1 2 3 4 5 6 7**
7. Meja bantuan menunjukkan minat untuk menyelesaikan masalah teknikal berkaitan Frog VLE. *The helpdesk shows a sincere interest in solving technical problems related to Frog VLE.*	**1 2 3 4 5 6 7**
8. Frog VLE mempunyai peralatan yang terkini. *The Frog VLE has up-to-date equipment.*	**1 2 3 4 5 6 7**
9. Kemudahan fizikal Frog VLE kelihatan menarik. *The Frog VLE's physical facilities are visually appealing.*	**1 2 3 4 5 6 7**

*** Meja bantuan Frog VLE: Perkhidmatan berkaitan Frog VLE oleh pentadbir Frog sekolah, Guru Besar/Pengetua, PKG, Meja bantuan secara atas talian, Hotline dan sebagainya.*

4.0 – KEINGINAN UNTUK GUNA (ITU)	**Tahap Persetujuan**
1. Saya berhasrat untuk terus menggunakan Frog VLE. *I intend to continue using the Frog VLE.*	**1 2 3 4 5 6 7**
2. Saya akan menggunakan Frog VLE secara kerap di masa hadapan. *I will regularly use the Frog VLE in the future.*	**1 2 3 4 5 6 7**
3. Sekiranya saya mempunyai capaian kepada Frog VLE, saya berhasrat untuk menggunakannya. *Assuming that I have access to the Frog VLE, I intend to use it.*	**1 2 3 4 5 6 7**
4. Saya berhasrat untuk menjadi pengguna tegar Frog VLE. *I intend to be a heavy user of Frog VLE.*	**1 2 3 4 5 6 7**

Sila bulatkan nombor yang sesuai berdasarkan skala di bawah:

1---------- **7**

Sangat Tidak Setuju ***Sangat Setuju***

5.0 – PENGGUNAAN (U)	**Tahap Persetujuan**
1. Saya kerap menggunakan Frog VLE. *I frequently use the Frog VLE.*	**1 2 3 4 5 6 7**
2. Saya menggunakan Frog VLE pada bila-bila masa yang sesuai. *I use the Frog VLE whenever appropriate.*	**1 2 3 4 5 6 7**
3. Saya menggunakan Frog VLE secara sukarela. *I use Frog VLE voluntarily.*	**1 2 3 4 5 6 7**
4. Saya menggunakan Frog VLE untuk mengajar. *I use Frog VLE for teaching.*	**1 2 3 4 5 6 7**
5. Saya menggunakan Frog VLE untuk memberikan ujian kepada pelajar. *I use Frog VLE to give tests to my students.*	**1 2 3 4 5 6 7**
6. Saya menggunakan Frog VLE untuk berkomunikasi dengan pelajar. *I use Frog VLE to communicate with students.*	**1 2 3 4 5 6 7**
7. Saya menggunakan Frog VLE untuk bekerjasama dengan guru lain. *I use Frog VLE to collaborate with other teachers.*	**1 2 3 4 5 6 7**
8. Saya menggunakan Frog VLE untuk mendapatkan maklumat pendidikan. *I use Frog VLE to retrieve educational information.*	**1 2 3 4 5 6 7**
9. Saya menggunakan Frog VLE untuk mendapatkan sumber pengajaran. *I use Frog VLE to retrieve teaching resources.*	**1 2 3 4 5 6 7**

6.0 – KEPUASAN PENGGUNA (US)	**Tahap Persetujuan**
1. Saya berasa puas hati menggunakan Frog VLE. *I feel contented using Frog VLE.*	**1 2 3 4 5 6 7**
2. Saya berasa gembira menggunakan Frog VLE. *I feel pleased using Frog VLE.*	**1 2 3 4 5 6 7**
3. Saya rasa Frog VLE adalah sangat membantu. *I think the Frog VLE is very helpful.*	**1 2 3 4 5 6 7**
4. Saya rasa Frog VLE berjaya. *I think the Frog VLE is successful.*	**1 2 3 4 5 6 7**

Sila bulatkan nombor yang sesuai berdasarkan skala di bawah:

1---------- **7**

Sangat Tidak Setuju ***Sangat Setuju***

7.0 – FAEDAH BERSIH (NB)	**Tahap Persetujuan**
1. Frog VLE menjimatkan masa. *The Frog VLE is time-saving.*	**1 2 3 4 5 6 7**
2. Frog VLE meningkatkan kebolehan mengajar saya. *The Frog VLE enhances my teaching skills.*	**1 2 3 4 5 6 7**
3. Frog VLE membantu meningkatkan prestasi kerja saya. *The Frog VLE helps me improve my job performance.*	**1 2 3 4 5 6 7**
4. Frog VLE memperkasakan saya. *The Frog VLE empowers me.*	**1 2 3 4 5 6 7**
5. Frog VLE menyumbang kepada kejayaan kerjaya saya. *The Frog VLE contributes to my career success.*	**1 2 3 4 5 6 7**

8.0 – BEBAN KERJA (WL)	**Tahap Persetujuan**
1. Kadar kelajuan dalam tugas saya adalah terlalu pantas. *The pace in my job is too fast.*	**1 2 3 4 5 6 7**
2. Tugas saya adalah terlalu mendesak. *My job is too demanding.*	**1 2 3 4 5 6 7**
3. Tugas saya adalah sangat sibuk. *My job is very hectic.*	**1 2 3 4 5 6 7**
4. Saya mempunyai terlalu banyak kerja yang perlu dilakukan. *I have too much work to do on the job.*	**1 2 3 4 5 6 7**
5. Saya harus belajar strategi pengajaran yang baru untuk menggunakan Frog VLE. *I will have to learn new teaching strategies in order to use Frog VLE.*	**1 2 3 4 5 6 7**
6. Penggunaan Frog VLE akan meningkatkan beban kerja saya. *The use of Frog VLE will increase my workload.*	**1 2 3 4 5 6 7**

Bahagian C: Soalan Tambahan

Kami ingin bertanya kepada anda tentang senario semasa pelaksanaan Frog VLE di sekolah-sekolah di Malaysia.

1. Adakah anda menerima sebarang jenis latihan berkaitan Frog VLE? Jika YA, sila senaraikan.
   Ya ○ Tidak ○
   a. _____ c. _____
   b. _____ d. _____

2. Adakah terdapat jadual penggunaan Frog VLE di sekolah anda?
   Ya ○ Tidak ○

3. Adakah pihak pentadbir sekolah anda menyediakan sebarang sokongan atau panduan berkaitan Frog VLE?
   Ya ○ Tidak ○

4. Adakah pihak PPD, PKG atau Pengetua/Guru Besar memantau penggunaan Frog VLE di kalangan guru-guru?
   Ya ○ Tidak ○

SOALAN TAMAT - BAGI MEREKA YANG MEMPUNYAI PENGALAMAN MENGGUNAKAN FROG VLE

Bahagian D: Soalan Terbuka

(Untuk mereka yang tidak pernah menggunakan Frog VLE)

1. Kenapa anda tidak menggunakan Frog VLE?

……

……

……

……

2. Sila guna ruang ini untuk menulis sebarang komen atau cadangan berkaitan Frog VLE.

……

……

……

……

……

SOALAN TAMAT - BAGI MEREKA YANG TIDAK PERNAH MENGGUNAKAN FROG VLE

Masa dan kerjasama anda adalah sangat dihargai,
Terima Kasih.

Appendix B

List of Selected Schools

No	School	Level	Location	State	Method	Respondent
1	SK Padang Mat Sirat	Primary	Rural	Kedah	Postage	10
2	SK Taman Ria	Primary	Rural	Kedah	Postage	10
3	SK Hj. Salleh Masri	Primary	Rural	Kedah	Postage	10
4	SK Temonyong	Primary	Rural	Kedah	Postage	10
5	SK Permatang Tiong	Primary	Rural	Kedah	Postage	10
6	SBP Integrasi Kubang Pasu	Secondary	Rural	Kedah	Postage	10
7	SMK Batu 17	Secondary	Rural	Kedah	Postage	10
8	SMK Ayer Puteh Dalam	Secondary	Rural	Kedah	Postage	10
9	SMKA Sik	Secondary	Rural	Kedah	Postage	10
10	SMK Syed Ibrahim	Secondary	Rural	Kedah	Postage	10
11	SK Taman Bersatu	Primary	Urban	Kedah	Postage	10
12	SK Taman Rakyat	Primary	Urban	Kedah	Postage	10
13	SK Gurun (Pusat)	Primary	Urban	Kedah	Postage	10
14	SK Laguna Merbok	Primary	Urban	Kedah	Postage	10
15	SMK Taman Jelutong	Secondary	Urban	Kedah	Postage	10
16	Maktab Mahmud Pokok Sena	Secondary	Urban	Kedah	Postage	10
17	SMA Nurul Islam Ayer Hitam	Secondary	Rural	Kedah	Postage	10
18	SMK Sungai Pasir Kecil	Secondary	Urban	Kedah	Postage	10
19	SMK Simpang Kuala	Secondary	Urban	Kedah	Postage	10
20	SK Alma Jaya	Primary	Rural	Penang	Postage	10
21	SK Rantau Panjang	Primary	Rural	Perak	Postage	10
22	SK Pangkalan TLDM II	Primary	Rural	Perak	Postage	10
23	SK Permatang Tok Mahat	Primary	Rural	Penang	Postage	10
24	SK Batu Maung	Primary	Rural	Penang	Postage	10
25	SJKT Ladang Padang Meiha	Primary	Rural	Kedah	Postage	10
26	SMA Darrusaadah	Secondary	Rural	Kedah	Postage	10
27	SK Seri Impian	Primary	Rural	Penang	Postage	10
28	SK Bandar Baru Perda	Primary	Rural	Penang	Postage	10
29	SK Batu Feringghi	Primary	Rural	Penang	Postage	10
30	SMK Mutiara Impian	Secondary	Rural	Penang	Postage	10
31	SMK Taman Widuri	Secondary	Rural	Penang	Postage	10
32	SMKA Al-Irshad	Secondary	Rural	Penang	Postage	10
33	SMK Bukit Mertajam	Secondary	Urban	Penang	Walk-In	10
34	SMK Pmtg Tok Labu	Secondary	Rural	Penang	Postage	10
35	SK Convent 1	Primary	Urban	Penang	Postage	10
36	SK Tanjong Tokong	Primary	Urban	Penang	Postage	10
37	SMK Abdullah Munshi	Secondary	Urban	Penang	Postage	10
38	SMK Hamid Khan	Secondary	Urban	Penang	Postage	10
39	SMK Bertam Indah	Secondary	Urban	Penang	Postage	10
40	SMK Kuala Perlis	Secondary	Urban	Perlis	Walk-In	10
41	SMK Derma	Secondary	Urban	Perlis	Walk-In	10
42	SMK Syed Alwi	Secondary	Rural	Perlis	Walk-In	10

43	SK Behor Empiang	Primary	Rural	Perlis	Postage	10
44	SK Guar Nangka	Primary	Rural	Perlis	Postage	10
45	SK Padang Keria	Primary	Rural	Perlis	Postage	10
46	SK Santan	Primary	Rural	Perlis	Postage	10
47	SMK Arau	Secondary	Rural	Perlis	Postage	10
48	SMK Syed Sirajuddin	Secondary	Rural	Perlis	Postage	10
49	SMK Padang Besar Utara	Secondary	Rural	Perlis	Postage	10
50	SK Dato Wan Ahmad	Primary	Urban	Perlis	Postage	10
51	SMK Sanglang	Secondary	Rural	Perlis	Postage	10
52	SMK Putra	Secondary	Urban	Perlis	Postage	10
53	SM Sains Tuanku Syed Putra	Secondary	Urban	Perlis	Postage	10
54	SK Padang Gajah	Primary	Rural	Perak	Postage	10
55	SK Batu Hampar	Primary	Rural	Perak	Postage	10
56	SK Jelutong	Primary	Rural	Perak	Postage	10
57	SK Tun Dr Ismail	Primary	Rural	Perak	Postage	10
58	SMK Raja Lope Nor Rashid	Secondary	Rural	Perak	Postage	10
59	SMK Bukit Jana	Secondary	Rural	Perak	Postage	10
60	SMK Tanjong Rambutan	Secondary	Rural	Perak	Postage	10
61	SK Labu Besar	Primary	Rural	Kedah	Walk-In	10
62	SK Bukit Selambau	Primary	Rural	Kedah	Walk-In	10
63	SK Convent Father Barre	Primary	Urban	Kedah	Walk-In	10
64	SMK Simpang Pulai	Secondary	Rural	Perak	Postage	10
65	SK Jelapang	Primary	Urban	Perak	Postage	10
66	SK Datin Khadijah	Primary	Urban	Perak	Postage	10
67	SMK Kg. Dato' Seri Kamaruddin	Secondary	Urban	Perak	Postage	10
68	SM Sains Tapah	Secondary	Rural	Perak	Postage	10
69	SMK Kg. Dato' Ahmad Said	Secondary	Urban	Perak	Postage	10
70	SMK Bukit Merchu	Secondary	Urban	Perak	Postage	10
71	SMK St. Bernadette's Convent	Secondary	Urban	Perak	Postage	10
72	SK Sultan Abdul Aziz	Primary	Urban	Perak	Postage	10
73	SK (P) Treacher Methodist	Primary	Urban	Perak	Postage	10
74	SMK Panglima Bukit Gantang	Secondary	Urban	Perak	Postage	10
75	SK Sungai Nibong	Primary	Urban	Penang	Postage	10
76	SMK Datuk Onn	Secondary	Urban	Penang	Postage	10
77	SJKC Chong San	Primary	Rural	Perak	Postage	10
78	SMA Shamsul Maarif Al Wataniah	Secondary	Rural	Perak	Postage	10
79	SMK Syed Hassan	Secondary	Urban	Perlis	Postage	10
80	SK Seberang Ramai	Primary	Urban	Perlis	Postage	10
81	SK Seri Perlis	Primary	Urban	Perlis	Postage	10
82	SJKT Palanisamy Kumaran	Primary	Rural	Kedah	Postage	10
83	SMA (Arab) Annajah	Secondary	Rural	Kedah	Postage	10
84	SK Kampung Baharu	Primary	Rural	Perak	Postage	10
85	SK Bendang Kering	Primary	Rural	Perak	Postage	10
TOTAL		Primary: 43 Secondary: 42	Rural: 51 Urban: 34	Perlis: 17 Kedah: 26 Penang: 18 Perak: 24	Postage: 78 Walk-In: 7	850

Appendix C

Current EIS Implementation in Malaysia

System	Function(s)	User(s)	Category
Sistem Analisa Peperiksaan Sekolah (SAPS)	Store, retrieve & analyze examination result.	Teachers, Parents	Education Management
Sistem Pengurusan Pentaksiran Berasaskan Sekolah (SPPBS)	Manages data related to students assessment.	Teachers	Education Management
Sistem Pertukaran Guru (egTUKAR)	Manages teachers' transfer application.	Teachers	Education Management
Sistem Pengoperasian Data (e-Operasi)	Manages teachers' service information (academic b.g., service history, personal info, training info etc.)	Teachers	Education Management
Sistem Pengurusan Latihan Guru (eSPLG)	Manages information of teachers' training / workshop / courses etc.	Teachers	Education Management
Sistem Kenaikan Pangkat (ePANGKAT)	Manages data related to teachers' promotion.	Teachers	Education Management
Aplikasi Pangkalan Data Murid (APDM)	Manages students' data	Teachers	Education Management
Sistem Pengurusan Literasi & Numerasi (LINUS-NKRA)	Manage LINUS data (e.g., screening test result and pupils' profile)	Teachers	Education Management
Smart School Qualification Standard (SSQS)	Manages data of ICT implementation in schools (for smart school standard measurement).	Teachers, Students	Education Management

Sistem Automasi Penarafan Pusat Sumber Bersepadu (IQ-PSS)	Manages Resource Center data for library rating.	Teachers	Education Management
Sistem Automasi Program NILAM Bersepadu (i-NILAM)	Manages data of students' reading program (NILAM)	Teachers	Education Management
Learning Management System (LMS)	Manages material for teaching & learning, including courseware.	Teachers, Students, Parents	Teaching & Learning
Sistem Pengurusan Sekolah (EMIS) / (SPS)	Integrates all the current EIS (single sign-on).	Teachers, Students	Education Management Teaching & Learning
Frog Virtual Learning Environment (Frog VLE)	A web-based learning system that replicates real-world learning by integrating virtual equivalents of conventional concepts of education.	Teachers, Students, Parents	Education Management, Teaching & Learning
eKEHADIRAN	Sub-module in APDM – for students' attendance management.	Teachers	Education Management
Sistem Pengurusan Aset Alih Kerajaan (SPA)	Manages assets in schools	Teachers	Education Management
Sistem e-Profil Kerjaya Murid (SePKM)	For counseling teachers	Teachers	Education Management
Sistem Salahlaku Disiplin Murid (SSDM)	Manages student's discipline record	Teachers	Education Management
Sistem Maklumat Prasekolah Kebangsaan (SMPK)	Pre-school management system	Teachers	Education Management
Sistem Pengurusan Buku Teks (eSPBT)	Text book management system	Teachers	Education Management

Appendix D_1

Studies of ICT in Education (Malaysia)

Authors	Issue	Findings
(Ghavifekr et al., 2014)	Identified the level of ICT integration in teaching and learning activity in the classroom by primary school teachers.	Most of the teachers are general users who frequently used the ICT facilities for doing their work in the staffroom rather than using them in their classroom for teaching and learning purposes.
(Narinasamy & Mamat, 2013)	Discussed the need for incorporating the use of ICT in teaching Moral Education.	Lack of ICT utilization by teachers in teaching Moral Education.
(Rahman et al., 2013)	The use of ICT throughout the implementation of standard based curriculum in the national preschools of Malaysia, focusing on the preschool teachers' attitude and practices, and the problems they faced in using ICT in the teaching and learning process.	Teachers in the national preschools were positive in their attitudes toward employing ICT in teaching and learning; however, they still lacked in terms of their practices.
(Sharifah Nor & Kamarul Azman, 2011)	The readiness of using ICT in teaching and its effects on the work and behavior of preschool children.	No significant difference in the pupils' work and behavior based on the teaching approach used by preschool teachers.
(Surif et al., 2014)	Science teacher's level of awareness and practice towards the importance of ICT integration in the process of teaching and learning.	Most teachers had a high level of awareness towards the importance of ICT integration in the process of teaching and learning Science. However, teacher's practice of ICT application in the process of teaching and learning Science was average.

Appendix D_2

Previous Studies of EIS in Malaysia

Author(s)	Type of EIS	Issue(s)	Finding(s)	Model(s)	Focus
(Norin Farizah, 2013)	Maklumat Murid (SMM) & Aplikasi Pangkalan Data Murid (APDM)	The implementation of SMM & APDM in student's data management.	1. Strong relationship APDM & SMM – student data management 2. Similar function.	TAM, Scientific Management Theory	Adoption (Acceptance / Usage)
(Mohd Faizal et al., 2014)	Education Management Information System (EMIS)	The EMIS is not being fully utilized. To evaluate the EMIS	Model of Successful Use of EMIS	Delone & McLean IS Success Model	Evaluation (Benefits to users)
(Norashikin et al., 2014)	Sistem Pengurusan Sekolah (SPS)	Pilot Study - to measure the acceptance of SPS	The real study can be conducted.	TAM	Adoption (Acceptance / Usage)
(Anuar & Mohd Nordin, 2015)	SPS	The implementation of SPS needs an effective method.	Kaizen routine in SPS implementation.	-	Implementation Strategy
(Norazilawati et al., 2013)	Frog VLE	To investigate the strengths and weaknesses of Frog VLE implementation in initial stage among Science teachers.	Teachers are familiar with the system. Frog VLE improves the quality of education. There several challenges and barriers in implementing Frog VLE.	-	Pedagogy
(Nor Azlah & Fariza, 2014)	Frog VLE	To investigate the role of communication skills in the implementation of Frog VLE in schools.	The implementation of Frog VLE is still weak. Communication skills among the teachers need to be improved in order to enhance the utilization of Frog VLE.	Communication Theory	Pedagogy
(Ummu Salma & Fariza, 2014)	Frog VLE	To investigate teachers' competency in Frog VLE for teaching and learning.	There is an improvement of Frog VLE competencies among teachers.	-	Pedagogy

(Kaur & Hussein, 2015)	Frog VLE	To observe the readiness of Frog VLE utilization as a teaching method among teachers in a secondary schools	The readiness level is low. The main constraint in Frog VLE implementation: Workload & Training Issues.	TRA, TAM & Theory of Reflective Model (Wallace, 1991)	Adoption (Acceptance / Usage)
(Campbell et al., 2015)	Frog VLE	Evaluation of the rubric & learning designs of the cloud-based (Frog VLE) content.	The rubric is reliable, with a few modifications needed, especially in navigation flow.	Technological Pedagogical and Content Knowledge (TPACK) framework	Pedagogy
(Mohd Rosli et al., 2015)	Frog VLE	To measure the acceptance of Frog VLE	Significant -Perceived usefulness, perceived ease of use, instructional design, convenience, technological factor and computer self-efficacy.	TAM	Adoption (Acceptance / Usage)
(Cheok & Wong, 2014)	Frog VLE	To identify factors of e-learning satisfaction among teachers (Frog VLE)	The new model of End User IS Satisfaction	TAM, D&M	Evaluation (Usage / User Satisfaction)
(Cheok & Wong, 2016)	Frog VLE	Teachers' experiences in using FROG VLE in their teaching and learning.	The challenges and limitations. The benefits and strength of the e-learning.	-	Pedagogy
(Saiful Afzan et al., 2014)	Frog VLE	To examine the student's acceptance toward Frog VLE	Model of student's acceptance toward VLE	UTAUT	Adoption (User Satisfaction)
(Hiong & Umbit, 2015)	Frog VLE	Factors that influence the use of Frog VLE among lecturers in the Teacher Education Institute.	Attitude is the main factor that influenced the use.	TAM	Adoption (Acceptance / Usage)
(Shahaimi & Fariza, 2015)	Frog VLE	Implementation and the challenges.	Overview of the implementation and challenges.	-	Concept
(Thah, 2014)	Frog VLE	Success criteria for Frog VLE implementation	Functionality and usability of the VLE and the ability to facilitate collaborations are what a VLE should be.	Scriven (1967) evaluation paradigm	Evaluation (Pedagogical Tool, User-Friendly & Collaboration Tool)

Appendix E_1

Previous Studies of VLE in Malaysia

No	Author	Issue(s)	Finding(s)	Model(s)	Focus	Setting
1.	(Campbell et al., 2015)	Teachers' cloud- based resource development.	A rubric to evaluate the TPACK alignment of cloud-based learning designs.	Technological Pedagogical and Content Knowledge (TPACK)	Pedagogy	-
2.	(Cheok & Wong, 2016)	Teachers' experiences in using FROG VLE in their teaching and learning.	The challenges and limitations. The benefits and strength of the e-learning.	-	Pedagogy	Urban
3.	(Cheok & Wong, 2014)	Teachers' e-learning satisfaction.	Model of teachers' e-learning satisfaction.	TAM, D&M (1992)	Usage, User satisfaction	-
4.	(Hiong & Umbit, 2015)	Factors that influence the use of Frog VLE among lecturers in the Teacher Education Institute.	Attitude is the main factor that influenced the use.	TAM	Usage (adoption)	Urban
5.	(Kaur & Hussein, 2015)	Teachers' readiness to use Frog VLE.	Teacher's ICT literacy and training as the influential factors.	TRA, TAM, Theory of Reflective Model	Adoption	Urban
6.	(Mohd Rosli et al., 2015)	The acceptance of Frog VLE	Significant -Perceived usefulness, perceived ease of use, instructional design, convenience, technological factor and computer self-efficacy.	TAM	Adoption	Urban

7.	(Nor Azlah & Fariza, 2014)	Communication skills among teachers to attract student toward Frog VLE.	Low usage of Frog VLE.	Communication theory	Pedagogy	-
8.	(Norazilawati et al., 2013)	Frog VLE usage among science teachers	The Internet connection speed should be increased, reduce teacher's workload, and teacher's attitude toward VLE training.	-	Pedagogy	Urban
9.	(Saiful Afzan et al., 2014)	Student's acceptance of Frog VLE	Model of Frog VLE Students' Acceptance.	UTAUT	Adoption	Urban
10.	(Shahaimi & Fariza, 2015)	Implementation and the challenges.	Overview of the implementation and challenges.	-	Concept	-
11.	(Thah, 2014)	Success criteria for Frog VLE implementation	Functionality and usability of the VLE and the ability to facilitate collaborations are what a VLE should be.	Scriven (1967) evaluation paradigm	Evaluation	Rural & Urban
12.	(Ummu Salma & Fariza, 2014)	The level of Frog VLE literacy among teachers.	There is an improvement in terms of Frog VLE literacy among teachers.	-	Pedagogy	Urban

Appendix E_2

Example of Previous Studies that Applied DeLone & McLean IS Success Model

Educational Information Systems (EIS)

No	Authors	Scope / IS	Country
1.	(Mohd Faizal et al., 2014)	Education Management Information System (EMIS)	Malaysia
2.	(Eom, 2012)	E-learning management systems (LMS) in university	USA
3.	(Dai et al., 2011)	Easy Teaching (ET) Web	Taiwan
4.	(Eom et al., 2012)	E-learning management systems (LMS) in university	USA
5.	(Cheok & Wong, 2014)	Frog VLE	Malaysia
6.	(Cheng, 2014)	Digital library - university	Taiwan
7.	(Lwoga, 2013)	Library 2.0 technologies - university	Tanzania

Other IS

No	Authors	Scope / IS	Country
1.	(Aggelidis & Chatzoglou, 2012)	Hospital Information System	East Macedonia and Thrace
2.	(Hosnavi & Ramezan, 2010)	HRMIS in Iranian Oil Company	Iran
3.	(Davarpanah & Mohamed, 2013)	Human Resource Information Systems (HRIS) success factors in a higher education context.	Malaysia
4.	(Göğüş & Özer, 2014)	Accounting Software	Turkey
5.	(Iskender & Ozkan, 2015)	E-government transformation success.	Turkey
6.	(Jing et al., 2014)	G2C E-governance systems	China
7.	(Khayun et al., 2012)	e-Excise (On-line tax payment system)	Thailand
8.	(Visser, Van Biljon, & Herselman, 2013)	Further Education and Training (FET) IS	South Africa
9.	(Al-Debei et al., 2013)	The role of web portals in improving job performance	Jordan
10.	(Ainin et al., 2012)	PTPTN portal	Malaysia

Appendix F_1

Summary of Studies Related to the Information Quality (IQ) of IS

Author(s)	Information System	Country	Measurement(s)
(Bento & Costa, 2013)	ERP	Portugal	Content, Accuracy, Format, Relevance, Usability, Reliability & Information Integrity
(J. V. Chen et al., 2015)	Online Tax Filling System	Philippine	Completeness, Reliably, Relevance, Responsiveness & Timeliness
(Floropoulos, Spathis, Halvatzis, & Tsipouridou, 2010)	Taxation IS	Greece	Completeness, Accuracy, Reliability & Timeliness
(Iivari, 2005)	Mandatory IS	Finland	Completeness, Precision, Accuracy, Reliability, Currency & Format
(Nelson, Todd, & Wixom, 2005)	Data Warehousing	USA	Accuracy, Completeness and Currency & Format
(Rai et al., 2002)	Integrated Student IS (quasi-voluntary IS)	USA	Content, Accuracy & Format
(Seddon & Kiew, 1996)	Departmental Accounting System	USA	Timeliness, Accuracy, Relevance & Format
(Gorla, Somers, & Wong, 2010)	Accounting Information Systems	Hong Kong	Accuracy, Timeliness (response time), Completeness, Relevance & Consistency
(Zhou, 2013)	Mobile Payment Services	China	Relevance, Sufficiency, Accuracy & Timeliness
(Hazen et al., 2014)	Reverse Logistic IS	USA	Accuracy, Timeliness
(Eom et al., 2012)	E-learning	USA	Accuracy, Relevance, Sufficiency, Format & Timeliness
(Wixom & Todd, 2005)	Data Warehousing	USA	Currency, Accuracy, Completeness & Format
(Teo et al., 2009)	G2C E-Government	Singapore	Sufficiency, Timeliness, Accuracy, Relevance, Format & Reliability
(C.-W. D. Chen & Cheng, 2009)	Online Shopping	Taiwan	Currency, Accuracy & Relevance

Appendix F_2

Summary of Studies Related to the System Quality (SyQ) of IS

Author(s)	Information System	Country	Measurement(s)
(Alshibly, 2014)	E-HRM	Jordan	Performance Characteristics, Functionality & Usability
(Chatterjee, Chakraborty, Sarker, Sarker, & Lau, 2009)	Mobile Work in Healthcare	USA	Extent of Data Processing, Extent of Information Access, Communicability & Portability
(Floropoulos et al., 2010)	Taxation IS	Greece	Reliability, Validity, Flexibility and Understandability
(Iivari, 2005)	Mandatory IS	Finland	Flexibility, Integration, Response Time, Error Recovery, Convenience of Access & Language
(Nelson et al., 2005)	Data Warehousing	USA	Accessibility, Reliability, Response time, Flexibility & Integration
(Y. S. Wang & Liao, 2008)	G2C E-Government	Taiwan	User-Friendly & Ease of Use
(Wixom & Todd, 2005)	Data Warehousing	USA	Reliability, Flexibility, Integration, Accessibility & Timeliness
(Gorla et al., 2010)	General IS	Hong Kong	Flexibility & Sophistication
(Teo et al., 2009)	G2C E-Government	Singapore	Ease of Use & User-Friendly
(Goh, 2014)	E-Commence Website	Singapore	Availability, Usability, Reliability, Adaptability and Response Time
(Lee-Post, 2009)	e-learning (Online Course)	USA	Ease of Use, User-Friendly, Stability, Security, Timely & Responsive
(Eom, 2012)	LMS	USA	Availability, Usability & Accessibility
(C.-W. D. Chen & Cheng, 2009)	Online Shopping	Taiwan	Response time, Reliability, Flexibility & Usability
(J. V. Chen et al., 2015)	Online Tax Filling System	Philippine	Ease of Use, Usability & Accessibility
(Zhou, 2013)	Mobile Payment Services	China	Response Time & Ese of Use
(Lwoga, 2013)	Library 2.0	Africa	Usability, Availability & Reliability

Appendix F_3

Summary of Studies Related to the Service Quality (SeQ) of IS

Author(s)	Information System	Country	Measurement(s)
(Chatterjee et al., 2009)	Mobile Work in Healthcare	USA	Reliability & Support
(J. V. Chen et al., 2015)	Online Tax Filling System	Philippine	Reliability, Responsiveness, Assurance & Empathy
(Floropoulos et al., 2010)	Taxation IS	Greece	Improved Quality, Simplified and Standardized Process, Flexible Interaction, Improved Control, Improved Cooperation & Reduced Time
(Goh, 2014)	E-Commence Website	Singapore	Assurance, Responsiveness, Empathy & Support
(Lee-Post, 2009)	e-learning (Online Course)	USA	Prompt, Responsiveness, Fair, Assurance & Availability
(Teo et al., 2009)	G2C E-Government	Singapore	Reliability, Prompt, Responsiveness, Empathy, Meet the Users' Need & Timely
(Y. S. Wang & Liao, 2008)	G2C E-Government	Taiwan	Empathy, Security & Personalization
(Zhou, 2013)	Mobile Payment Services	China	Reliability, Responsiveness, Assurance & Personalization
(Yengin et al., 2011)	e-learning	-	Prompt, Responsive, Fair, Assurance & Available
(L. Zhao, Lu, Zhang, & Chau, 2012)	Mobile Value-Added Services	China	Interaction, Environment & Outcome
(El-kiki & Lawrence, 2006)	M-Government	-	Awareness, Accessibility, Availability, Reliability, Accuracy, Responsiveness, Courtesy & Helpful

Appendix F_4

Summary of Studies Related to the Intention to Use (ITU) of IS

Author(s)	Information System	Model	Country	Measurement(s)
(Agarwal & Prasad, 1997)	World Wide Web	TAM, TRA, DOI	-	Intention for future use
(Al-Debei et al., 2013)	Web Portal	Updated D&M	Jordan	Intention for future use/re-use
(Khader, 2015)	M-Learning	TAM	Jordan	Intention for continuous use
(C. Kim, Mirusmonov, & Lee, 2010)	M-Payment	TAM	Korea	Intention for future use (for non-user) & Intention to continuously use.
(Klein, 2007)	Patient-Physician Portal	TAM	U.S.A	Behavioral intention
(Limayem & Cheung, 2008)	Internet-Based Learning Technologies (Blackboard)	IS Continuous Model/Expected Confirmation Model	-	Continuous intention
(Bhattacherjee, 2001)	Online Banking	Expectation Confirmation Theory (ECT)	-	Continuous intention for usage
(Lwoga, 2013)	Library 2.0	Updated D&M	Tanzania	Intention to re-use
(Mohammadi, 2015)	e-learning	Updated D&M, TAM	Iran	Intention for future use
(Ramayah et al., 2010)	e-learning	Updated D&M	Malaysia	Intention to continue use
(Teo et al., 2009)	E-Government	Updated D&M	Singapore	Intention to continue use
(Y. S. Wang, 2008)	E-Commerce	Updated D&M, TAM	Taiwan	Intention to re-use
(L. Zhao et al., 2012)	Mobile Value Added Services	Updated D&M	China	Continuance intention
(Zhou, 2013)	Mobile Payment Service	Updated D&M	China	Continuous intention
(Zhu et al., 2013)	Travelling Web-sites	Updated D&M, TAM	-	Continuous intention

Appendix F_5

Summary of Studies Related to the Use (U) of IS

Author(s)	Information System	Country	Measurement(s)
(Iskender & Ozkan, 2015)	E-Government IS	Turkey	Nature of Use, No of Site Visit & No of Transaction
(Yengin et al., 2011)	e-learning	-	PowerPoint slides, Audio, Script, Discussion board, Case studies, Practice problems, Excel tutorials, Assignments & Practice exam - (Nature of Use)
(Goh, 2014)	E-Commence Website	Singapore	Visit, Place Order, Payment, Feedback and Inquiries, Discussion & Advertising and Marketing
(Al-Debei et al., 2013)	Web Portal	Jordan	Voluntary of Use, Frequency of Use, Duration of Use, & Use to Perform Specific Task
(Baraka et al., 2013)	Call Center IS	Egypt	Nature of Usage (Inquiry, Orders, Technical Support, Financial Transaction and Other Services) & Amount of Use (User Retention Rate, New Customer, Customer Re-occurrence)
(Chong et al., 2010)	Web-based Business-to-Consumer (B2C) E-Commerce	USA	Updating account information, Accessing information to solve problems, Information retrieval to solve problems & Completion of the transaction
(Eom, 2012)	Learning Management System (LMS)	USA	Frequency of Use, Dependency to the LMS
(Eom et al., 2012)	e-learning	USA	Frequency of Use, Dependency to the LMS
(Halonen et al., 2010)	Knowledge Transfer in VLE	Finland	Density, Timetable, Study Material, Exercise & Guideline to Accomplishing Degree

Appendix F_6

Summary of Studies Related to the User Satisfaction (US) of IS

Author(s)	Information System	Country	Measurement(s)
(Yengin et al., 2011)	e-learning	-	Overall Satisfaction, Enjoyable Experience, Overall Success & Recommend to Other Faculties
(Balasubramaniam, Jagannathan, & Natarajan, 2014)	Internet Banking	India	Efficiency, Recommend to Others, Correct Decision & Overall Satisfaction
(Alhendawi & Baharudin, 2014)	Web-Based IS	International Organization	Internal Satisfaction & Overall Satisfaction
(Iskender & Ozkan, 2015)	E-Government Services	Turkey	Repeat Use, Repeat Visit
(Manchanda & Mukherjee, 2014)	DSS in Banking	Oman	Meet the Users' Need, Efficient, Effective & Overall Satisfaction
(Zhou, 2013)	Mobile Payment Services	China	Overall Satisfaction, Contented (willing to use) & Enjoyment
(Lawrence, 2011)	Healthcare IS	USA	Efficiency, Effectiveness & Overall Satisfaction
(Goh, 2014)	E-Commence Website	Singapore	Repeat Visit, Repeat Order, Reduced Complains (Information, System, and Services) & Overall Satisfaction

Appendix F_7

Summary of Studies Related to the Net Benefits (NB) of IS

Author(s)	Information System	Country	Measurement(s)
(Al-Debei et al., 2013)	Web Portal	Jordan	Job Performance (Productivity, Task Innovation, Customer Satisfaction & Management Control)
(Baraka et al., 2013)	Call Center IS	Egypt	Growth in customer base, Increased sale, Market share, Global reach, Profit, Productivity & Return on investment
(Chong et al., 2010)	Web-based Business-to-Consumer (B2C) E-Commerce	USA	Reduction of administrative costs, Reduction in time, Enhancement of service, Enhancement of customer relationship & Improved communication
(Halonen et al., 2010)	Knowledge Transfer in VLE	Finland	Positive Aspects (Benefits to studies, Benefits to accomplishing degrees) & Negative Aspects (Use of time, Self-guidance, Teachers' output)
(Iskender & Ozkan, 2015)	E-Government IS	Turkey	Cost savings in public institutions, Expanded ways to reach stakeholders, Additional services provided to stakeholders, Reduced search costs for information & Time savings for stakeholders
(Yengin et al., 2011)	e-learning	-	Positive aspects (Enhanced learning / Improved Productivity, Empowered / Personal Valuation, Time savings, Academic Success), Negative aspects (Lack of contact, Isolation, Quality concerns, Technology) & Dependence

Appendix F_8

Workload (WL) Measurement by the Previous Studies

Author(s)	Issue	Country	Measurement(s)
(Reyes & Imber, 1992)	Teachers' Workload	USA	Fairness of Overall Workload
(Kember & Leung, 2006)	Student's Workload	Hong Kong	Task Completion Without Stress & Reasonable Amount of Workload
(Sharifah et al., 2014)	Teachers' Workload – Technical Secondary Schools	Malaysia	Total Hours (Score for Test and Exam, School-Based Assessment, Management of Workshop, Student Information, Equipment and Machine, Teachers and Staff Information & Management of Workshop Store)
(Smith & Bourke, 1992)	Teachers' Workload	Australia	Administration, Teaching, Resources & Assessment
(Denton et al., 2002)	Homecare Workers - Healthcare	Canada	Job Pace, Job Demand, Excessive Jobs, Multiple Task at the Same Time, Responding to Crisis, Work-related-problem to Home & Hectic
*(Sanchez & Aleman, 2011)	ICT Tools to Support Attendance-Based Teaching	Spain	ICT as another workload
(Selwood, 2005)	Primary School Teachers' Use of ICT for Administration and Management	England	ICT to reduce Workload
(Boyle et al., 1995)	Dimensions of Teacher Stress	Mediterranean Islands of Malta and Gozo	Responsibility & Volume of Works
(Selwood & Pilkington, 2005)	ICT to reduce Teachers' Workload	England & Wales	-

Appendix F9

Previous IS Studies Related to Teacher's Workload

No	Author(s)	Approach	Country	Type of EIS	Empirical Evidence (Related to Workload)	Remarks
1	(Higgins, Beauchamp, & Miller, 2007)*	SLR	UK	Interactive Whiteboard	-N/A	- WL is not the focus of the study. - Might reduce teacher's workload.
2	(Selwood & Pilkington, 2005)*	Government Report - Survey	UK	ICT (for teaching)	ICT reduce teachers' workload	- Did not focus on specific EIS. - Descriptive analysis. - Did not mention how Workload influence the use of ICT.
3	(Abuhmaid, 2011)**	Qualitative	Jordan	ICT (in general)	Workload hinders teachers from using ICT	- Result cannot be generalized.
4	(Cheok & Wong, 2016)**	Qualitative	Malaysia	Frog VLE	Workload hinders teachers from using ICT	- Result cannot be generalized.
5	(Hu et al., 2003)**	Survey	Hong Kong	MS PowerPoint	- N/A	- WL is not the focus of the study. - Workload hinders teachers from using ICT - Suggestion based on literature review.

6	(Inan & Lowther, 2009)#	Survey	USA	Technology (in general)	-N/A	- WL is not the focus of the study. - Suggesting the future research should integrate WL into the framework.
7	(Johari & Siti Norazlina, 2010)**	Survey	Malaysia	ICT (in general)	-N/A	- WL is not the focus of the study. - Workload (time barrier) hinders teachers from using ICT. - Discussed in conclusion.
8	(M. S. H. Khan et al., 2012)**	Traditional Review	Bangladesh	ICT (in general)	-N/A	- WL is not the focus of the study. - Discussion based on the LR. - Workload hinders teachers from using ICT.
9	(Letsoalo et al., 2014)**	Survey	South Africa	NIECS - Examination IS	- Workload hinders officers from using the system.	- Descriptive analysis. - Did not map out WL in framework.
10	(Norazilawati et al., 2013)**	Qualitative	Malaysia	Frog VLE	- Workload hinders teachers from using the system.	- Result cannot be generalized.
11	(Rahman et al., 2013)**	Survey	Malaysia	ICT (in general)	- Workload (time barrier) hinders teachers from using the system.	- Descriptive analysis. - Only use 30 respondents. - Did not map out WL in framework.
12	(Raman & Yamat, 2014)**	Qualitative	Malaysia	ICT (in general)	- Workload hinders teachers from using the system.	- Result cannot be generalized.
13	(Sanchez & Aleman, 2011)***	Survey	Spain	ICT (in general)	- ICT as extra workload for teachers.	- Descriptive analysis. - Did not map out WL in framework.
14	(Selwood, 2005)*	Survey	UK	ICT (for management)	- ICT reduce teachers' workload	- Descriptive analysis. - Did not map out WL in framework. - Did not mention how Workload influence the use of ICT.

15	(Vinluan, 2011)*	Survey	Philippines	ICT (for management)	- ICT reduce teachers' workload	- Descriptive analysis. - Did not map out WL in framework.
16	(D. Wu et al., 2010)***	Survey	US & Austria	Asynchronous Participatory Examinations	- N/A	- WL is not the focus of the study. - Discussion in LR section. - The system (could) bring extra workload for teachers.
17	(Zawiyah & Mariah, 2008)***	Survey	Malaysia	SMPP-KP (EMIS)	- The system as extra workload for teachers	- Did not map out WL in framework. - Old study - 10 years ago. - Data collected in one district only.
18	(Condie & Munro, 2007)*	Traditional Review	UK	ICT (in general)	- ICT reduce teachers' workload	- Discussion based on the LR.
19	(Sharifah et al., 2014)***	Survey	Malaysia	EIS	- The system as extra workload for teachers	- WL is not the focus of the study. -To investigate sources of teachers' workload. - Descriptive analysis. - Did not mention how Workload influence the use of ICT.

Note: ** - ICT could reduce teachers' workload, ** - Workload hinders teachers from using ICT, *** - ICT as extra workload, # -suggestion for future research.*

Appendix G

The Analysis of Instrument's Content Validity using Content Validity Index (CVI)

1. Information Quality

Items:

1a - The Frog VLE provides information that is exactly what I need.
1b - The Frog VLE provides information that is relevant to teaching.
1c - The Frog VLE provides sufficient information.
1d - The Frog VLE provides information that is easy to understand.
1e - The information provided by Frog VLE is clearly presented on the screen.
1f - Information provided by Frog VLE is in a useful format.
1g - The Frog VLE provides up-to-date information.
1h - Through Frog VLE, I get the information I need in time
1i -. Information provided by Frog VLE is reliable.
1j - Overall, the Frog VLE provides me with high-quality information.

No	Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Total Agreement	i-CVI	Action
1	1a	4	4	3	3	4	4	3	7	1.00	Retain
2	1b	4	3	3	4	4	4	3	7	1.00	Retain
3	1c	4	4	2	3	3	4	3	6	0.86	Retain
4	1d	4	4	4	4	4	4	3	7	1.00	Retain

5	1e	2	2	4	4	4	3	3	5	0.71	Delete
6	1f	4	2	2	4	4	3	4	5	0.71	Delete
7	1g	4	4	4	4	4	4	4	7	1.00	Retain
8	1h	4	4	1	4	4	4	3	6	0.86	Retain
9	1i	4	4	4	2	4	4	4	6	0.86	Retain
10	1j	4	4	2	4	1	4	1	4	0.57	Delete
									s-CVI/Ave	**0.86**	**PASS**

2. System Quality

Items:

2a - The Frog VLE is always available.
2b - The Frog VLE is user-friendly.
2c - The Frog VLE has attractive features that appeal to users.
2d - It is easy for me to share the content on Frog VLE.
2e - It is easy for me to post comments on Frog VLE.
2f - It is easy to find the information I need from the Frog VLE.
2g - The Frog VLE provides interactive features between users and system.
2h - The Frog VLE enables me to accomplish task quicker.
2i - The Frog VLE provides a personalized information presentation.
2j - The Frog VLE is easy to use.
2k - The Frog VLE is easy to navigate.
2l - The Frog VLE provides high-speed information access.
2m - The Frog VLE enables me to get on to it quickly.
2n - The Frog VLE quickly loads all the text and graphics.
2o - The Frog VLE is accessed easily from inside the school.
2p - The Frog VLE is accessed easily from outside the school.
2q - The Frog VLE is available most of the time.
2r - The Frog VLE functions accurately most of the time.
2s - Overall, in terms of system quality, I would rate the Frog VLE highly.

No	Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Total Agreement	i-CVI	Action
1	2a	4	4	4	4	4	4	3	7	1.00	Retain
2	2b	4	4	3	3	4	4	4	7	1.00	Retain
3	2c	4	4	3	3	4	4	4	7	1.00	Retain
4	2d	4	2	1	4	4	4	4	5	0.71	Delete
5	2e	4	2	1	4	4	4	4	5	0.71	Delete
6	2f	2	1	4	4	3	4	4	5	0.71	Delete
7	2g	4	4	2	4	4	4	2	5	0.71	Delete
8	2h	4	4	4	3	4	4	4	7	1.00	Retain
9	2i	4	2	1	3	4	4	3	5	0.71	Delete
10	2j	4	2	4	4	4	2	4	5	0.71	Delete
11	2k	4	4	4	4	4	4	4	7	1.00	Retain
12	2l	4	4	4	4	4	3	4	7	1.00	Retain
13	2m	4	2	4	2	4	4	3	5	0.71	Delete
14	2n	4	4	4	4	2	4	2	5	0.71	Delete
15	2o	4	2	2	4	3	4	3	5	0.71	Delete
16	2p	4	2	2	4	4	4	1	4	0.57	Delete
17	2q	4	4	1	4	4	3	1	5	0.71	Delete
18	2r	4	4	4	3	4	4	3	7	1.00	Retain
19	2s	4	3	3	3	1	3	1	5	0.71	Delete
									s-CVI/Ave	**0.81**	**PASS**

3. Service Quality

Items:

3a - The Frog VLE offers diversiform contact channels (FAQ, email, toll-free number, etc.)
3b - The Frog VLE provides a proper level of on-line assistance.
3c - The Frog VLE helpdesk is prompt in responding to my queries.
3d - The Frog VLE helpdesk respond in a cooperative manner.
3e - The Frog VLE helpdesk provide high availability for consultation.
3f - The Frog VLE helpdesk is available in case I have a technical problem.
3g - The Frog VLE helpdesk is willing to help whenever I need support.
3h - The Frog VLE helpdesk gives users individual attention.
3i - The Frog VLE helpdesk is highly knowledgeable.
3j - The behavior of Frog VLE helpdesk instills confidence in me.
3k - The Frog VLE is designed with teachers' best interests at heart.
3l - The Frog VLE is designed to satisfy the needs of teachers.
3m - Service provided by Frog VLE understands my needs.
3n - The Frog VLE helpdesk dedicate enough time to resolve my specific technical concerns.
3o - The helpdesk shows a sincere interest in solving technical problems related to Frog VLE.
3p - The Frog VLE has up-to-date equipment.
3q - The Frog VLE's physical facilities are visually appealing.
3r - Overall, in terms of service quality, I would rate the Frog VLE highly.

No	Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Total Agreement	i-CVI	Action
1	3a	4	2	1	3	4	4	3	5	0.71	Delete
2	3b	4	4	1	4	4	4	1	5	0.71	Delete
3	3c	4	4	4	4	4	4	3	7	1.00	Retain
4	3d	4	2	4	3	4	2	3	5	0.71	Delete
5	3e	3	4	2	3	2	4	4	5	0.71	Delete
6	3f	3	3	4	4	4	4	4	7	1.00	Retain
7	3g	4	4	2	3	4	4	3	6	0.86	Retain

8	3h	4	4	2	3	4	4	4	6	0.86	Retain
9	3i	4	4	4	4	4	4	4	7	1.00	Retain
10	3j	2	4	2	4	4	4	3	5	0.71	Delete
11	3k	4	2	3	4	4	4	1	5	0.71	Delete
12	3l	2	3	2	3	4	4	3	5	0.71	Delete
13	3m	2	2	4	3	4	4	2	4	0.57	Delete
14	3n	4	4	2	3	4	4	3	6	0.86	Retain
15	3o	4	4	4	4	4	4	3	7	1.00	Retain
16	3p	3	4	4	3	4	4	3	7	1.00	Retain
17	3q	4	4	2	3	3	4	3	6	0.86	Retain
18	3r	4	4	2	4	1	4	1	4	0.57	Delete
									s-CVI/Ave	**0.81**	**PASS**

4. Intention to Use

Items:

4a - I intend to continue using the Frog VLE.
4b - I will regularly use the Frog VLE in the future.
4c - I will continue using the Frog VLE in the future.
4d - My intention is to continue using the Frog VLE rather than traditional classroom teaching.
4e - Assuming that I have access to the Frog VLE, I intend to use it.
4f - I intend to be a heavy user of Frog VLE.

No	Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Total Agreement	i-CVI	Action
1	4a	4	4	2	3	4	4	4	6	0.86	Retain
2	4b	4	4	4	4	4	4	4	7	1.00	Retain
3	4c	4	2	1	4	1	4	4	4	0.57	Delete

4	4d	4	4	1	3	4	2	2	4	0.57	Delete
5	4e	4	4	4	4	4	4	3	7	1.00	Retain
6	4f	4	4	2	4	4	4	4	6	0.86	Retain
									s-CVI/Ave	**0.81**	**PASS**

5. Use

Items:

5a - I frequently use the Frog VLE.
5b - I use the Frog VLE a lot.
5c - I use the Frog VLE whenever possible.
5d - I use the Frog VLE whenever appropriate.
5e - I depend upon the Frog VLE.
5f - I use Frog VLE voluntarily.
5g - I use Frog VLE for teaching.
5h - I use Frog VLE to conduct tests to my students.
5i - I use Frog VLE to communicate with students.
5j - I use Frog VLE for collaboration with other teachers.
5k - I use Frog VLE to retrieve educational information.
5l - I use Frog VLE to retrieve teaching resources.

No	Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Total Agreement	i-CVI	Action
1	5a	4	4	1	4	4	4	4	6	0.86	Retain
2	5b	4	2	1	4	4	4	3	5	0.71	Delete
3	5c	4	2	1	3	4	4	4	5	0.71	Delete
4	5d	4	4	1	3	4	4	4	6	0.86	Retain
5	5e	1	4	1	4	4	4	4	5	0.71	Delete
6	5f	4	4	4	2	4	4	4	6	0.86	Retain
7	5g	4	4	4	4	4	4	4	7	1.00	Retain

8	5h	4	4	4	4	4	4	4	7	1.00	Retain
9	5i	4	4	4	4	4	4	4	7	1.00	Retain
10	5j	4	4	4	4	4	4	4	7	1.00	Retain
11	5k	4	4	2	4	4	4	4	6	0.86	Retain
12	5l	4	4	4	4	4	4	4	7	1.00	Retain
									s-CVI/Ave	**0.88**	**PASS**

6. User Satisfaction

Items:

6a - Most of the teachers bring a positive attitude towards the Frog VLE function.
6b - Most of the teachers bring a positive evaluation towards the Frog VLE function.
6c - I feel contented with using Frog VLE.
6d - I feel pleased with using Frog VLE.
6e - I think the Frog VLE is very helpful.
6f - I think the Frog VLE is successful.
6g - Overall, I am satisfied with the Frog VLE.

No	Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Total Agreement	i-CVI	Action
1	6a	1	4	1	4	4	4	3	5	0.71	Delete
2	6b	1	4	1	2	4	4	3	4	0.57	Delete
3	6c	4	4	4	3	4	4	4	7	1.00	Retain
4	6d	4	4	1	3	4	4	4	6	0.86	Retain
5	6e	4	4	4	4	4	4	4	7	1.00	Retain
6	6f	4	4	4	3	4	4	4	7	1.00	Retain
7	6g	4	4	1	4	1	4	2	4	0.57	Delete
									s-CVI/Ave	**0.82**	**PASS**

7. Net Benefits

Items:

8a - The Frog VLE is time-saving.
8b - The Frog VLE enhances my teaching skills.
8c - The Frog VLE helps me improve my job performance.
8d - The Frog VLE empowers me.
8e - The Frog VLE contributes to my career success.
8f - Overall, Frog VLE is more beneficial to use.

No	Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Total Agreement	i-CVI	Action
1	8a	4	4	4	3	4	4	4	7	1.00	Retain
2	8b	4	4	4	4	4	4	4	7	1.00	Retain
3	8c	4	4	4	4	4	4	4	7	1.00	Retain
4	8d	4	4	4	3	4	4	4	7	1.00	Retain
5	8e	4	4	4	3	4	4	3	7	1.00	Retain
6	8f	4	4	1	3	1	3	1	4	0.57	Delete
									s-CVI/Ave	**0.93**	**PASS**

8. Workload

Items:

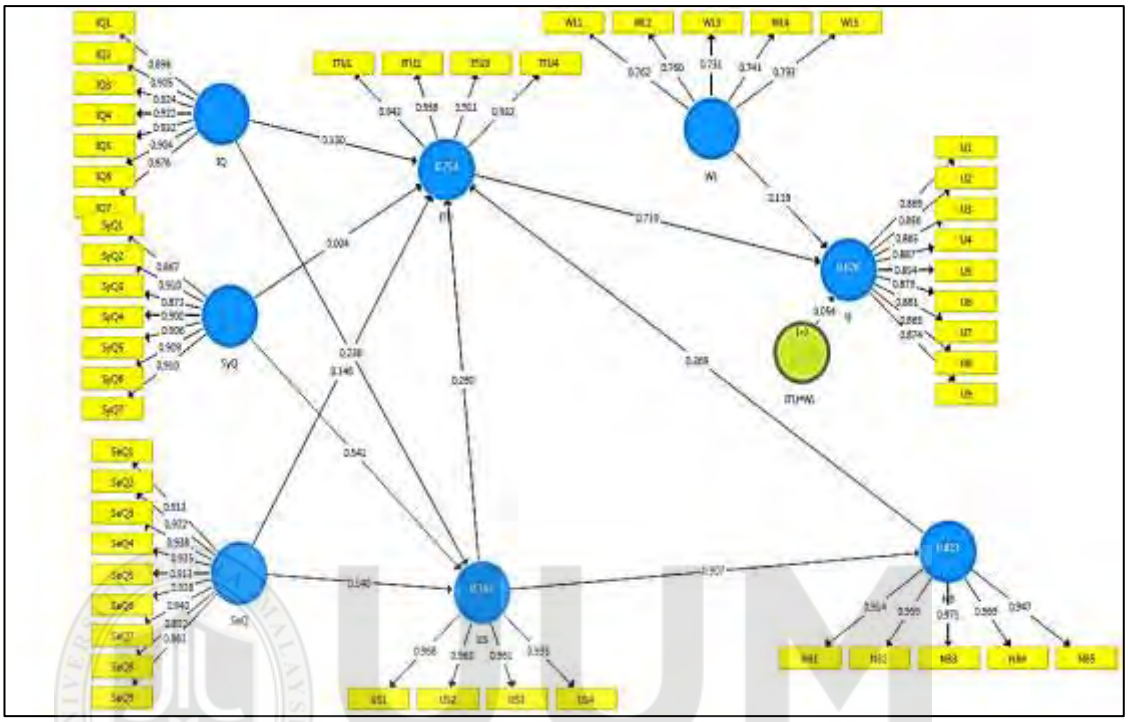
7a - The pace in my job is too fast.
7b - My job is too demanding.
7c - My job is very hectic.
7d - I have too much work to do.
7e - I am expected to do too many different tasks at the same time.
7f - I will have to learn new teaching strategies in order to use Frog VLE.
7g - The use of Frog VLE will increase my workload.
7h - The use of Frog VLE requires extra effort from me.

No	Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Total Agreement	i-CVI	Action
1	7a	4	4	4	3	4	4	4	7	1.00	Retain
2	7b	4	4	4	3	4	4	4	7	1.00	Retain
3	7c	4	4	4	3	4	4	4	7	1.00	Retain
4	7d	4	4	4	1	4	4	4	6	0.86	Retain
5	7e	2	4	1	1	4	3	4	4	0.57	Delete
6	7f	4	3	3	2	4	4	4	6	0.86	Retain
7	7g	4	4	2	3	4	4	4	6	0.86	Retain
8	7h	4	4	4	2	4	4	2	5	0.71	Delete
									s-CVI/Ave	**0.86**	**PASS**

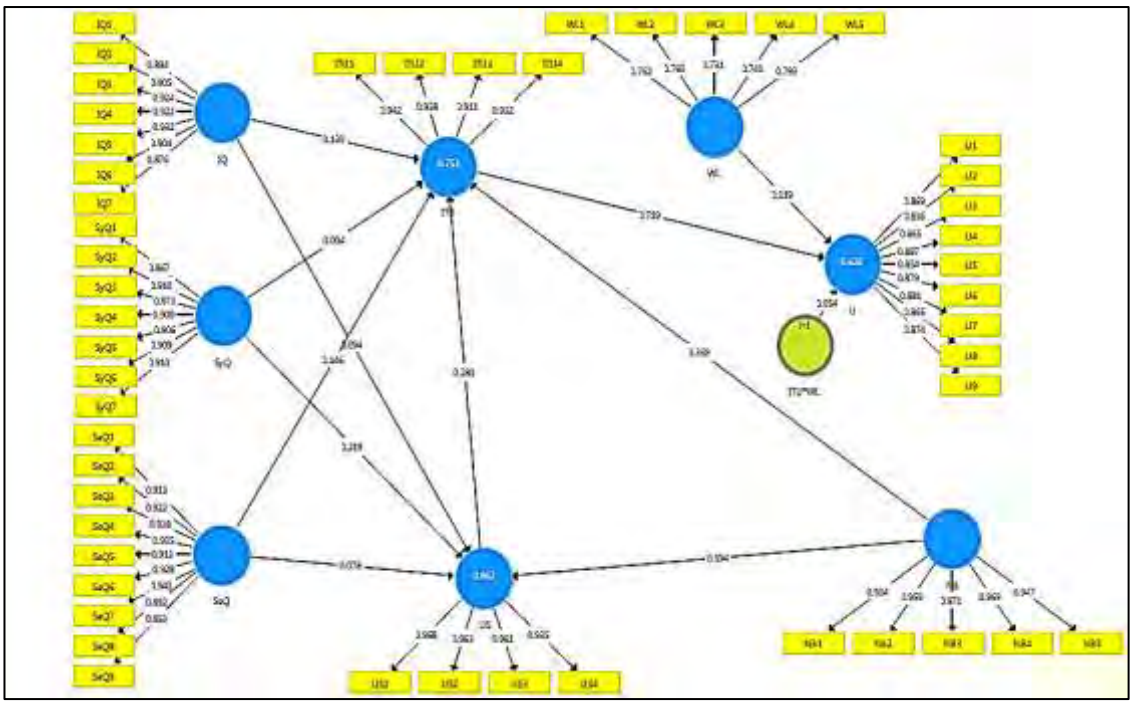
Note:
** Cut Off Point for i-CVI = 0.78 (Lynn, 1986), Cut Off Point for s-CVI/Ave = 0.80 (Davis, 1992)*

Appendix H

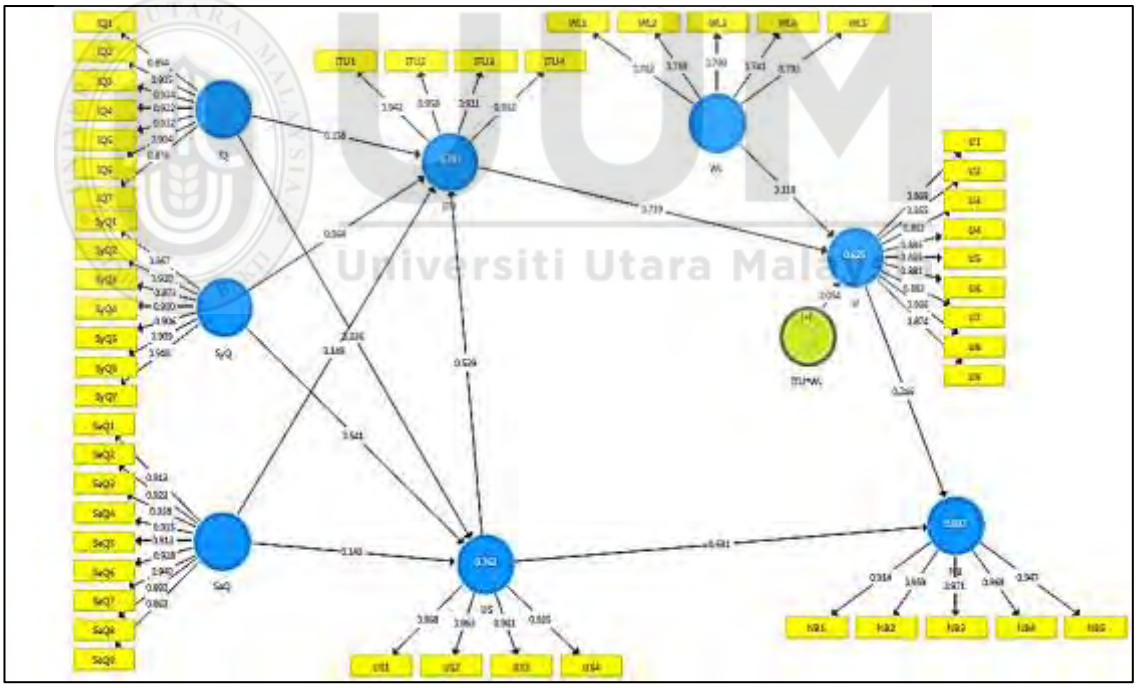
Comparison of Possible Models Retrieved from the Conceptual Model



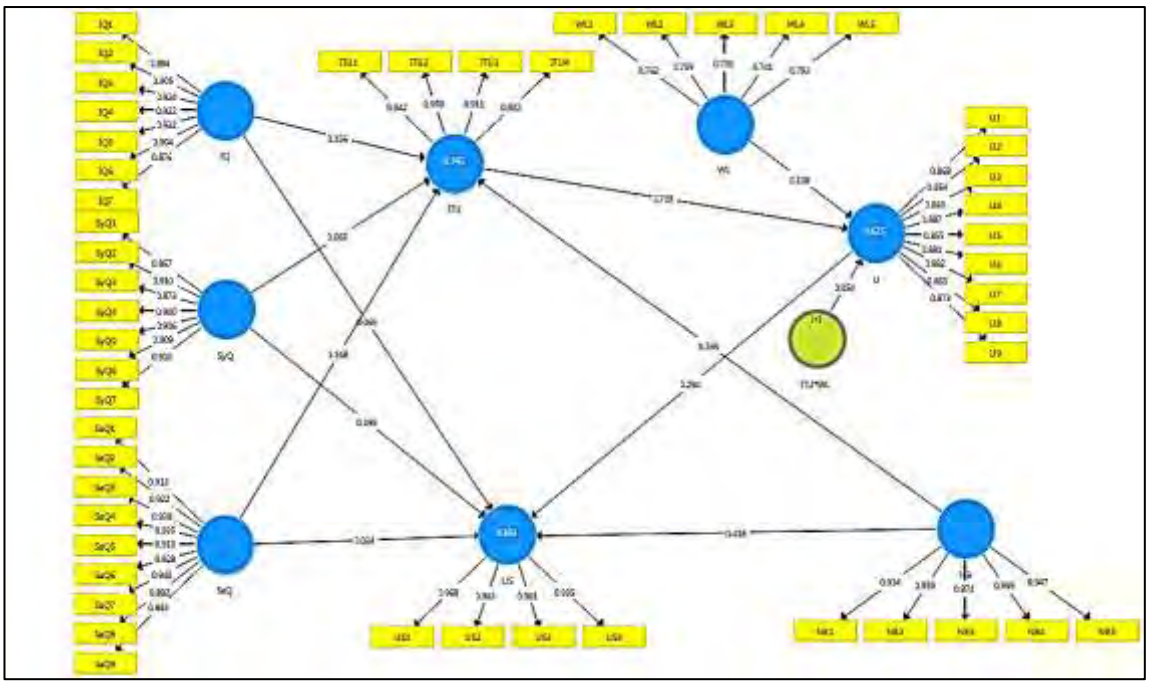
MODEL 1



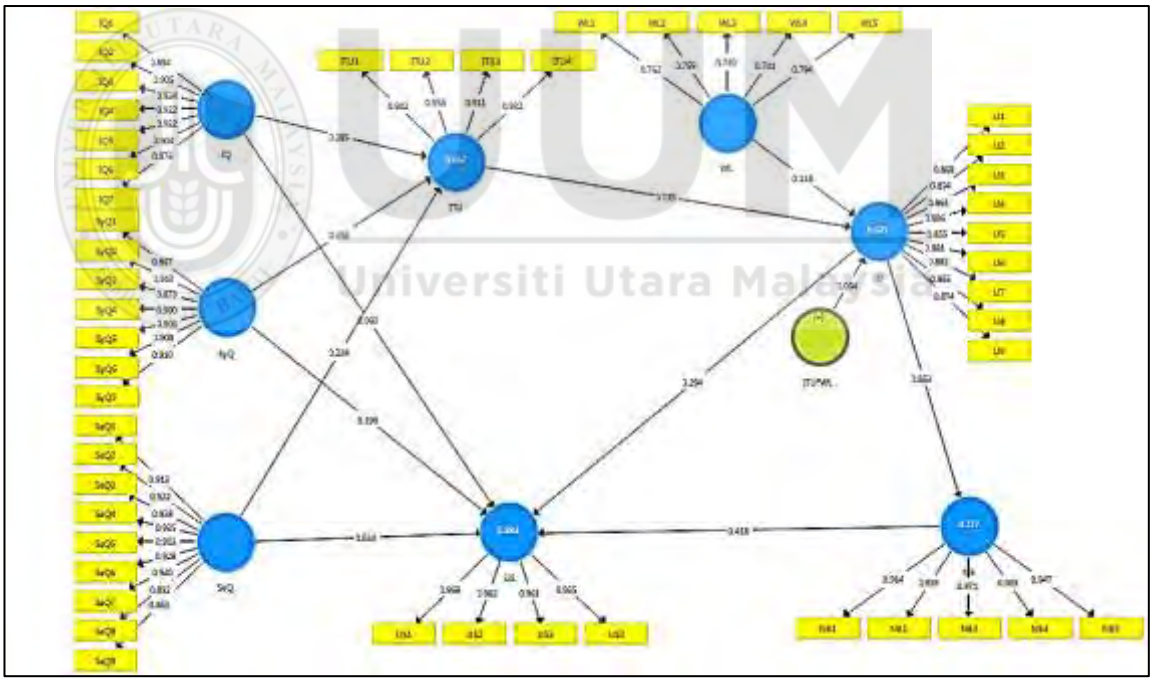
MODEL 2



MODEL 3



MODEL 4



MODEL 5

Appendix I_1

VLE Implementation Strategy for Malaysian Schools

Frog Virtual Learning Environment

Implementation Strategy for Malaysian Schools
(Appertaining to the VLE Success Model)

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TABLE OF CONTENT

1 CONTEXT

1.1 Background Information

Advances in technology together with changes in pedagogic methodologies have seen many educational institutions around the world invest in implementing virtual learning environments (VLE) to support the teaching and learning process. A VLE provides school communities with a unified platform for content delivery, communication, assessment, and course management. It also helps to improve students' skills through engaging them in online learning activities and communication. It is one of the largest digital learning platforms available to schools with over 10 million students and teachers using it around the world. In Malaysia, the Frog VLE is available to all 10,000 schools throughout the country through the 1BestariNet project. It is an award-winning, cloud-based virtual learning environment that has been designed by Frog Education to simplify and enhance teaching and learning, communication and administration. With experience in the market for nearly 15 years, the Frog VLE is not just used in Malaysia but is also being used worldwide in 23 countries, in over 12,000 schools, and more than 20 million users within a community of teachers and learners.

1.2 VLE Success Model

Despite the successful record of Frog VLE in other countries, the statistic of usage in Malaysia is still disappointing, which indicated that it is not on the right path of success. Therefore, we have conducted an empirical research to investigate the factors of VLE success among Malaysian teachers. As a result, we have successfully produced the VLE success Model. This model, which structurally map out the related significant factors, describes how the VLE continuous usage could be established, as shown in Figure 1.

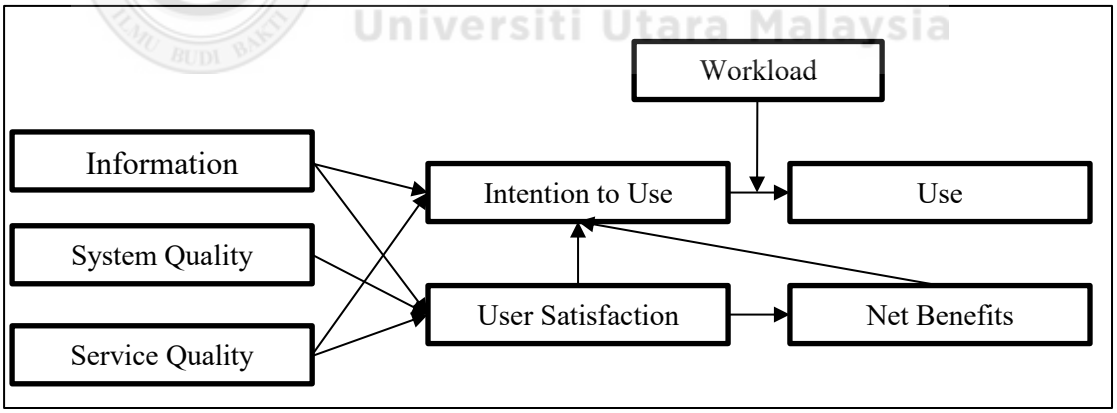

Figure 1. VLE Success Model

The VLE Success Model portrays the inter-relationship between technology and human aspects in securing the VLE success, which indicated by the continuous usage. The constructs of Information Quality, System Quality and Service Quality represent the technology aspects, whereas the Intention to Use, Use, User Satisfaction, Net Benefits and Workload serve as the human aspects. To interpret this model, we have operationalized the entire related constructs, as shown in Table 1.

Table 1
Operational Definition of VLE Success Constructs

Construct	Operational Definition	Desired Criteria
INFORMATION QUALITY	The extent of output quality produced by Frog VLE.	Accurate, Relevant, Sufficient, Easy to understand, Current, Timely and Reliable.
SYSTEM QUALITY	The extent of Frog VLE technical performance.	Always available, Usable, User-Friendly, Attractive, Accessible and Reliable.
SERVICE QUALITY	The extent of services, supports and encouraging environments provided by Frog VLE and 1BestariNet.	Responsive, Assurance, Empathy and Tangible.
INTENTION TO USE	The extent of intention for future use.	High intention.
USE	The utilization of Frog VLE.	Frequent and Regular.
USER SATISFACTION	The feeling of pleasure or displeasure toward the Frog VLE.	High satisfaction.
NET BENEFITS	The impacts or benefits of using Frog VLE.	Saves time, improves productivity and improves personal value.
WORKLOAD	The amount of works and the phase of job requirements in teachers' career.	Frog VLE eases the teachers in dealing with the workload.

The VLE Success Model explains that the user satisfaction is caused by the good quality of information, system and service by Frog VLE. This feeling of satisfaction will trigger the development of intention to continue using the system, which further leads to the actual usage. In addition, the benefits of using Frog VLE should also cause the teachers to continue using Frog VLE. As for the workload, this model suggests that the heavier workload carries by teachers, the more they will be motivated to use Frog VLE.

Practically, this model suggests that; to ensure the VLE success, the quality of Frog VLE, in terms of produced information, the system itself and support services need to meet the teacher's expectation. Furthermore, the Frog VLE should be beneficial for teachers. Only when these criteria are met, then the Frog VLE could be a good solution in combating teachers' ever-increasing workload.

It has been identified from previous 'whole-school school system changes' e.g. a case study from The High School of Glasgow, UK, that without an efficient implementation strategy, many objectives and advantages of the VLE may remain unachieved. Therefore, it is vital to the success of an effective implementation, that a considered strategy should be put in place. As a guideline to fully utilize this model, we present the implementation strategy for Frog VLE implementation in Malaysian Schools. This document is intended to provide the VLE authorities and school's management with an overview of that strategy. Its intention is to ensure appropriate consideration is given to the deployment of the Frog VLE and should be seen as a working document which will continually evolve as matters are further evaluated.

1.3 Rationale

The addition of a Frog VLE within the school has the potential to bring a plethora of benefits, and these will be outlined below. However, it is also recognized that to implement such a large project, which is woven through the fabric of every aspect of school life, it will inevitably be met with some resistance. Therefore, why teachers resist change, and what steps we can do to minimize this, will also be examined in more detail before any implementation plan is formulated. The benefits of the Frog VLE will only be realized if teachers have been appropriately trained, understand those benefits and are encouraged to embrace its use.

In Malaysia, the teachers' resistance has been identified as the major issue, contributing the Frog VLE's overall statistic of low usage. In responding to this, we have started a study since 2015 to investigate the factors that influence the continuous usage of VLE. After almost three years of research, we have successfully produced the VLE Success Model, which mapped out the relationships between the factors. Therefore, in this paper, we outline the practical contributions of this model through the implementation strategy.

1.4 Frog VLE - Benefits to the Schools

A Frog VLE could make a significant contribution to many education areas by enhancing student learning and improving the student's school experience. Some of the main benefits it is capable of delivering include:

a) An 'anytime, anywhere' ethos, which better meets the needs of school's community.
b) Increasing range of options for teachers in terms of teaching, learning and assessment approaches, which in turn better support the diversity of student learning approaches.
c) Facilitating online learning experiences, which encourage student-centered learning, flexibility and choice.
d) Allowing teachers to provide instant and personalized feedback, as well as online self-assessment as a means to aid learning.
e) Encouraging development of the independent, self-motivated learner as well as engaging students in collaborative, creative multimedia group projects.
f) Creating online communities, which can provide a supportive environment for students through peer-to-peer interaction, peer review and assessment, group activities; which in turn help to build student's confidence in their own learning capabilities.
g) Supporting learning through an increased provision of, and access to, study materials.
h) Improving transparency and communication throughout the school community.
i) Reducing the school's carbon footprint.
j) Developing an integrated information system, providing enhanced user functionality and resulting in increased efficiency.
k) Allowing students, parents, and teacher to track progress.
l) Standardizing protocols resulting in a consistent, high-quality approach to learning materials.
m) Giving a single access point for timetables / school and student information / calendars / e-mail / grade books, etc.

n) Allowing teachers to use e-learning materials to support knowledge-based activities thus ensuring class contact time is more focused on active, student-centered learning exercises.

1.5 Challenges to Change

Before any plan can be devised it would be prudent to be aware of the inevitable resistance to change that will be encountered. This is due to the fact that most organizational changes are unsuccessful because of different forms of resistance. People are the most important asset in any organization, particularly schools, and their commitment and acceptance will be the main factor in determining effective implementation. Therefore, it is important to be aware of the reasons behind resistance so that these issues can be overcome. Teacher's resistance to VLE change includes the fear of:

a) Perception that VLE is less beneficial to them.
b) Feeling of unsatisfied with the quality of VLE.
c) Less control in their change than they had before.
d) Lowering the quality of their subject.
e) Limited access to ICT.
f) Their limited IT skills.
g) Migrating to new pedagogical approach.
h) Intellectual property rights and ownership of materials produced.
i) Change in their teaching practices.
j) Lack of official recognition for work with new technologies.
k) Lack of time.
l) Doing more than their job remit.
m) An increase in their workload.

Some of the key recommendations to minimize teacher's resistance include:

a) Prepare to make gradual changes and keep teachers informed along the way, so they feel part of the process and 'in the loop'.
b) Involve teachers in the design, development and understanding on the need for change.
c) Discuss with teachers their new roles, which will ensure their involvement and commitment.
d) Ensure adequate training at a variety of levels.
e) Share good practices among colleagues.

In summary, resistance to change is behind the failure of most IT-based projects. Therefore, addressing and realizing the factors behind the resistance and building those into our strategy will increase significantly our chances of a successful Frog VLE implementation.

2 STRATEGIC PLANNING

Strategic planning provides inputs for strategic thinking, which guides the actual strategy formation. By referring to VLE Success Model, we propose the school's VLE strategic plan,

including a diagnosis of the goal, strategy and situational analysis. To facilitate, the following template for Frog VLE Strategic Plan could be helpful (Table 2).

Table 2
Example of Template for School's Strategic Plan

FROG VLE STRATEGIC PLAN 2018 *SK Telanok, Cameron Highlands.*	
ABOUT US	
PAST	Where we have been.
TODAY	Where we are now.
VISION	Where we should go and why.
MISSION	Who we are, how we work toward our vision, what makes us unique.
CORE VALUE	Guiding principles of our work and how we operate.
GOALS	
OBSTACLES	What could prevent us from realizing our vision.
LONG-TERM GOAL	What we will do to realize our vision.
SHORT-TERM GOAL	What will be done in every month, for example.
MEASUREMENT OF SUCCESS	What benchmarks will be used as an indicator of success. In this case, VLE Success Model suggested the usage as an indicator.
STRATEGY	
RESOURCE ASSESSMENT	Infrastructure required to realize vision.
FINANCING	Assess strategy financial needs and avenues of income.
IMPLEMENTATION	Plan what needs to be done along implementation phases.
DISSEMINATION	How the plan will be announced/assigned, and to whom.
PROGRESS ASSESSMENT PLAN	How we will oversee progress, monitor success, and implement revisions.
PREVIOUS YEAR'S REFLECTION	
WEAKNESS	What has been identified as the weaknesses in last year's implementation.
STRENGTH	What has been identified as the strengths in last year's implementation.
SITUATIONAL ANALYSIS (SWOT)	
Internal Factors	
Strengths (+)	**Weaknesses (-)**
External Factors	
Opportunities (+)	**Threats (-)**
SWOT Analysis	
The overall analysis	

3 IMPLEMENTATION

From the VLE Success Model and our reading of literature available for successful change management within educational systems as well as identifying possible strategies to deal with resistance to change, it would appear that there are a number of steps that we have to integrate into the framework to ensure full utilization.

3.1 School Management - Vision and Sharing Awareness

To ensure that Frog VLE implementation run smooth;

a) School management and VLE strategic group need to have a clear vision of what they hope to achieve and share this fully and regularly with teachers.
b) The realization that nothing will happen without 'people' on board, i.e. teachers, students and parents.
c) Gradually raise the awareness of the impending changes.

3.2 VLE Facilities

Without a doubt, the facilities and infrastructure are the principal concern of the teachers in adopting Frog VLE, especially in rural schools. Indeed, our investigation has unveiled that the facilities and infrastructure's limitation, which leads to VLE availability and accessibility have been the main reason that hinders the teachers from employing the Frog VLE in their educational routines. In light of this, the school management and VLE strategic group should take some pro-active actions, especially in terms of monitoring and maintenance, as will be described in the later sections.

3.3 Training and Support

The level of training and support available to academic teachers has been crucial to the success of such a project, a factor often underemphasized in change, and one that has previously undermined the success of many e-learning projects. Therefore;

a) Ensure there is a program devised for on-going training and development.
b) Train teachers by showing the examples of VLE teaching methods to help them embed it into their pedagogy.
c) Ensure there is substantial development time given to teachers.

3.4 School's VLE Policy

The policy should;

a) Ensure the pace of change is controlled so as not to overwhelm the teacher, e.g. phased implementation.
b) Establish a robust yet flexible policy, with clearly defined protocols and processes.
c) Set clearly defined goals and targets that everyone is aware of.
d) Clear protocols identified for assessing supports, services, and VLE quality dimensions.

3.5 Teacher's Voice

Teachers are the most important group VLE users. Therefore, to establish the harmony and win-win situation of Frog VLE implementation, we should;

a) Identify the teachers perceived strengths, weaknesses, opportunities and threats (SWOT analysis) of developing a VLE – give them a voice.
b) Give them opportunities to voice and challenge their beliefs about VLE.
c) Identify teachers' needs and how the Frog VLE can be used to assist them.
d) Evaluative feedback procedures – lead to a realistic and effective approach to change management, as we will provide the guideline of teacher's perception assessment in the later section.

4 ROLES AND REPONSIBILITIES - DECISION-MAKING PROCESS

As part of this strategy, it is important to establish the necessary decision-making bodies that will help deliver the VLE implementation. It is significant also to establish clear remits for these groups and individuals.

4.1 Overview of VLE Group Structure

A. Members of Strategic Group
Role: Monitor individual initiatives, gauge overall development progress and make decisions with respect to maintaining a comprehensive cohesive look at the Frog VLE.
Members: Headmaster / Principal, Administrative Assistant Principal, Frog Admin, ICT coordinator.

B. Members of VLE Working Party
Role: Learning and teaching aspects of the Frog VLE, i.e. methodology, pedagogy, resources and assessment.
Members: Headmaster / Principal, Administrative Assistant Principal, Head of Unit / Head of Subject's Committee, Head of Digital Learning, Frog Administrator, District or School's Frog VLE Coach.

C. Frog VLE Coach
Role: Person responsible of creating resources and showcasing good practice.
Members: To be selected by Frog VLE Coach.

D. VLE Room (Computer Laboratory) Administrator
Role: Person responsible of the room, equipment, and facilities inside.
Members: To be selected.

E. VLE Gadgets Supervisor
Role: Person responsible of gadgets such as smartphones, tablets, dongles, etc., provided by MOE and 1BestariNet.
Members: To be selected.

F. Virtual Class Teachers
Role: Person responsible of creating their own class pages.
Members: All the class teachers

4.2 Detailed Responsibility of Individuals

As can be seen in Table 3, each of the members in Frog VLE group should be clarified of their role and job scope.

Table 3
Detailed Responsibility of Individuals

PERSON / GROUP	**RESPONSIBILITY / ROLE**
Principal / Headmaster	Overall responsibility for the whole school's VLE usage.
Technical Administrator	Overall responsibility for implementing software and technical maintenance. a) Controlling portal access. b) Linking to website. c) Email ownership, all students & teachers. d) Hardware requirements, maintenance & reports.
Curricular Resource Manager	a) Manage development of resources within a particular curricular area. b) Deploy resources into Frog VLE.
Head of Department / Head of Unit / Head of Subject's Committee	Overall responsibility for their department's usage. a) Generating/identifying overview of curricular goals (with help from VLE working party/curriculum working party). b) Quality assurance of teacher's planning (timetables, goals, etc.). c) Analyzing students' progress/data – future recommendations. d) Overall implementation of Frog VLE within the school. e) Development of file structure requirements. f) Ensuring new teacher are suitably trained in using Frog VLE. g) Collating data for future improvement. h) Responsibility for the development of resources in their department.
Classroom Teachers	Overall responsibility for their class page: a) Homework assignments. b) Information. c) Images / pictures. d) Managing goals / tracking students' progress. e) Creating their weekly educational timetable. f) Extra-curricular page. g) Termly goals / topics. h) Termly newsletter / information.
Head of Digital Learning / Frog Administrator	Responsible for : a) Creating & implementing the strategy. b) Develop protocols and management of administrative tasks. c) Generate/delete rooms and members.

	d) Evaluate usage data. e) Provide strategic operational direction. f) Creating users and room allocation. g) Continual teacher training. h) General housekeeping i) Development of assessment/reporting systems. j) Reviewing strategy / next steps.

5 MONITORING AND EVALUATION

Monitoring and evaluation of Frog VLE success should be devised by the 'VLE Strategic Group' and reviewed regularly. Quarterly or monthly meetings of this group will monitor and evaluate the delivery of effective teaching and learning through the Frog VLE. It is anticipated that activities related to 'good practice' will encourage the identification, dissemination and adoption of innovations and techniques beyond those specified in this version of the Frog VLE Strategy.

In this guideline, we suggest that the monitoring of Frog VLE implementation should be done based on the two perspectives in our VLE Success Model, which are technology and human. The following sections will explain in detail of each dimension that we should put into consideration.

5.1 Information Quality

As illustrated in our VLE Success Model, the information quality is one of the important technological aspects that will ensure the teacher's satisfaction and the sustainable usage of Frog VLE. To ensure that the information provided by Frog VLE truly meets the teacher's requirement, consistent monitoring and evaluation need to be done by the Frog Administrator. We suggest the following form for evaluating the information quality of Frog VLE (Table 4). This form should be filled monthly to reflect their VLE experience in the whole month. As we know, the education demand and syllabus rapidly change, and thus, the information quality should also congruently changes. This is just for a guideline, you may adjust the form accordingly. Upon the collective reflections by the teachers, Frog Administrator should produce the overall report to be included in the monthly documentation.

Table 4
Example of Information Quality Assessment Form

INFORMATION QUALITY ASSESMENT					
Name: _____Sarip Doll_____				**Date:** __12/03/2017____	
Subject Teaches: _Pemulihan Khas (Bahasa Melayu)_____				**Class:** _2 Harapan____	
Criteria	**No**	**Metric**	**Yes**	**No**	**Remark**
Accuracy	1	As required			The content of e-syllabus contains the wrong format for the remedial class.
Relevance	2	Relevant to teaching and learning activity			
Sufficiency	3	Sufficient			
Format	4	Easy			
Currency	5	Up to date			
Timeliness	6	In time			
Reliability	7	Reliable			Information in Frog Bulletin mentioned the wrong date for School's Sports Carnival.

Apart from this, Frog Administrator and Virtual Class teachers in school should also periodically update the related information under his/her authority such as on the notice board. This will ensure the currency of the information, and the teachers and students will get the full advantage of it.

5.2 System Quality

For monthly assessment of system quality, we suggest the following form to be filled by school's Frog Administrator (Table 5).

Table 5
Example of System Quality Assessment Form

SYSTEM QUALITY ASSESSMENT					
Month: ____January___		**Year:** ____2018___			
Criteria	**No**	**Metric**	**Yes**	**No**	**Remark**
Availability	1	Always available			VDI server offline on 12, 17 Jan.
Usability	2	Usable			
	3	User-Friendly			
	4	Attractive			
Accessibility	5	High-speed access			Speed below average on 3, 6 Jan.
Reliability	6	Function accurately			

5.3 Service Quality

As suggested by our VLE Success Model, the service quality is one of the most important elements in ensuring the teacher's VLE continuous usage. Therefore, we recommend the monthly assessment based on the following form (Table 6):

Table 6
Example of Service Quality Assessment Form

SERVICE QUALITY ASSESSMENT **Month:** ___January___ **Year:** ____2018___						
Source	**Criteria**	**No**	**Metric**	**Yes**	**No**	**Remark**
Helpdesk & Technical Supports	Responsiveness	1	Prompt			
		2	Always available			
	Assurance	3	Willing to help			
		4	Highly knowledgeable			
	Empathy	5	Sincere			
		6	Friendly			12 Jan - technician come to the school with an arrogant face, to fix the server break down.
Physical Facilities	Tangibility	7	Up-to-date equipment			

5.4 Measuring Frog VLE Success among Teachers

As we all know, teachers are the most important group of Frog VLE users. We cannot simply expect that the students use, while the teachers resist the system. Therefore, we should conceive the teachers as the determinant group of Frog VLE success. To ensure that the Frog VLE implementation truly meets the teachers' expectation, we suggest that the evaluation of their perceptions to be conducted for every semi-yearly. Based on our VLE Success Model, we propose that it can be done using the following instrument (see Table 7). This instrument has gone through strict validity and reliability tests and was proved to be robust for Frog VLE evaluation.

Table 7
Instrument to Measure Teacher's Perception of Frog VLE

1---------- 7
Extremely Disagree ***Extremely Agree***

2.0 – SYSTEM QUALITY	**Degree of Agreement**
1. The Frog VLE is always available.	**1 2 3 4 5 6 7**
2. The Frog VLE is user-friendly.	**1 2 3 4 5 6 7**
3. The Frog VLE has attractive features that appeal to me.	**1 2 3 4 5 6 7**
4. The Frog VLE enables me to accomplish task quicker.	**1 2 3 4 5 6 7**
5. The Frog VLE is easy to navigate.	**1 2 3 4 5 6 7**
6. The Frog VLE provides high-speed information access.	**1 2 3 4 5 6 7**
7. The Frog VLE functions accurately most of the time.	**1 2 3 4 5 6 7**

3.0 – SERVICE QUALITY	**Degree of Agreement**
1. The Frog VLE helpdesk is prompt in responding to my queries.	**1 2 3 4 5 6 7**
2. The Frog VLE helpdesk is available in case I have a technical problem.	**1 2 3 4 5 6 7**
3. The Frog VLE helpdesk is willing to help whenever I need support.	**1 2 3 4 5 6 7**
4. The Frog VLE helpdesk gives users individual attention.	**1 2 3 4 5 6 7**
5. The Frog VLE helpdesk is highly knowledgeable.	**1 2 3 4 5 6 7**

6. The Frog VLE helpdesk dedicates enough time to resolve my specific technical concerns.	**1 2 3 4 5 6 7**
7. The helpdesk shows a sincere interest in solving technical problems related to Frog VLE.	**1 2 3 4 5 6 7**
8. The Frog VLE has up-to-date equipment.	**1 2 3 4 5 6 7**
9. The Frog VLE's physical facilities are visually appealing.	**1 2 3 4 5 6 7**

4.0 – INTENTION TO RE-USE	**Degree of Agreement**
1. I intend to continue using the Frog VLE.	**1 2 3 4 5 6 7**
2. I will regularly use the Frog VLE in the future.	**1 2 3 4 5 6 7**
3. Assuming that I have access to the Frog VLE, I intend to use it.	**1 2 3 4 5 6 7**
4. I intend to be a heavy user of Frog VLE.	**1 2 3 4 5 6 7**

5.0 – TEACHER'S SATISFACTION	**Degree of Agreement**
1. I feel contented using Frog VLE.	**1 2 3 4 5 6 7**
2. I feel pleased using Frog VLE.	**1 2 3 4 5 6 7**
3. I think the Frog VLE is very helpful.	**1 2 3 4 5 6 7**
4. I think the Frog VLE is successful.	**1 2 3 4 5 6 7**

5.0 – NATURE OF USAGE	**Degree of Agreement**
10. I use Frog VLE voluntarily.	**1 2 3 4 5 6 7**
11. I use Frog VLE for teaching.	**1 2 3 4 5 6 7**
12. I use Frog VLE to give tests to my students.	**1 2 3 4 5 6 7**
13. I use Frog VLE to communicate with students.	**1 2 3 4 5 6 7**
14. I use Frog VLE to collaborate with other teachers.	**1 2 3 4 5 6 7**
15. I use Frog VLE to retrieve educational information.	**1 2 3 4 5 6 7**
16. I use Frog VLE to retrieve teaching resources.	**1 2 3 4 5 6 7**

6.0 – VLE BENEFITS	**Degree of Agreement**
1. The Frog VLE is time-saving.	**1 2 3 4 5 6 7**
2. The Frog VLE enhances my teaching skills.	**1 2 3 4 5 6 7**
3. The Frog VLE helps me improve my job performance.	**1 2 3 4 5 6 7**
4. The Frog VLE empowers me.	**1 2 3 4 5 6 7**
5. The Frog VLE contributes to my career success.	**1 2 3 4 5 6 7**

To determine the level of each VLE success dimension, the average of score needs to be calculated, as we provide the example in the next paragraph. As an indicator, the following range can be used (if you use 7-point scale).

1.0 - 3.0: Low
3.1 – 5.0: Moderate
5.1 – 7.0: High

For example, based on the following rating, the average of this teacher A's intention to continue using Frog VLE is;

$$\frac{1+2+3+2}{4} = 2$$

So, the average score of 2 means that the Teacher A has low intention to continue using the Frog VLE. Same goes to Teacher B, which gave the average score of 3.75

(moderate). Therefore, to calculate the mean score of all the teachers in that particular school, let's say; SK Telanok has two teachers, Teacher A and Teacher B. The average score for teachers' intention to continue using Frog VLE is 2.88, which falls in the category of low intention.

$$\frac{2 + 3.75}{2} = 2.88$$

Teacher A

4.0 – INTENTION TO RE-USE	Degree of Agreement
1. I intend to continue using the Frog VLE.	1 2 3 4 5 6 7
2. I will regularly use the Frog VLE in the future.	1 2 3 4 5 6 7
3. Assuming that I have access to the Frog VLE, I intend to use it.	1 2 3 4 5 6 7
4. I intend to be a heavy user of Frog VLE.	1 2 3 4 5 6 7

Teacher B

4.0 – INTENTION TO RE-USE	Degree of Agreement
1. I intend to continue using the Frog VLE.	1 2 3 4 5 6 7
2. I will regularly use the Frog VLE in the future.	1 2 3 4 5 6 7
3. Assuming that I have access to the Frog VLE, I intend to use it.	1 2 3 4 5 6 7
4. I intend to be a heavy user of Frog VLE.	1 2 3 4 5 6 7

5.5 Reports and Documentations

To ensure the successful implementation of Frog VLE, the proper documentation and reports need to be prepared. This reports and documentation will be the strong evidence for Frog VLE authorities like 1BestariNet to enhance their services. In this guideline, we suggest the monthly, semi-yearly and annual reports that need to be prepared (Table 8).

Table 8
VLE Reports and Documentations

Monthly			
No	**Report**	**Elements**	**Person-In-Charge**
1	Speed Test	Upload time	Frog Administrator Technical Administrator
		Download time	
2.	Facilities Monthly Report (e.g. Table 9)	Number of equipment	Frog Administrator VLE Room Administrator Technical Administrator
		Number of working equipment	
		Number of damaged/lost equipment	
		Details of the damaged, including the cause etc.	
		Maintenance	
3.	Usage (all type of users)	Average session time	Frog Administrator Head of Digital Learning Head of Department
		Unique users	
		Total log-ins	
4.	Teacher's Reflection on Information Quality	Generated based on Table 4	Frog Administrator Head of Digital Learning

5.	System Quality Assessment	Generated based on Table 5	Frog Administrator Head of Digital Learning
6.	Service Quality Assessment	Support	Frog Administrator Head of Digital Learning
		Maintenance	
Semi-Yearly			
No	**Report**	**Elements**	**Person-In-Charge**
1.	Teacher's perception (e.g. Table 10)	Information Quality (IQ)	Frog Administrator Head of Digital Learning
		System Quality (SyQ)	
		Service Quality (SeQ)	
		Intention to Re-use (ITU)	
		Teacher's Satisfaction (US)	
		VLE Benefits (NB)	
Annual			
No	**Report**	**Elements**	**Person-In-Charge**
1.	Strategic planning for next year	Goal	Strategic Group
		Strategy	
		Previous year's reflection	
		Situational analysis	

Table 9
Facilities Monthly Report

Date:					
No	**Equipment / Gadget**	**Quantity (Serial No)**	**Working**	**Lost / Damaged**	**Service**
1.	Frog Appliance	1 SKT/VLE/001	Yes	-	*Date: 10.02.17* *Details: Short circuit burned the switch. The service was done by 1BestariNet Technical Support*
2.	VDI Clients	5			
		SKT/VLE/2/001	Yes		
		SKT/VLE/2/002	Yes		
		SKT/VLE/2/003		Yes	
		SKT/VLE/2/004	Yes		
		SKT/VLE/2/005	Yes		

Table 10
Analysis of Teacher's Perceptions

School Name: SK Telanok, Cameron Highlands **Term:** 1/2018 **Total Teachers:** 12							
No	**Teacher**	**Average Score**					
		IQ	**SyQ**	**SeQ**	**ITU**	**US**	**NB**
1.	Said	2.10 Low	3.12 Average	2.50 Low	3.28 Average	4.06 Average	5.31 High
2.	Samad	2.12 Low	3.13 Average	2.58 Low	3.26 Average	4.03 Average	5.32 High
3.	Wok Yoh	2.22 Low	3.14 Average	2.54 Low	3.25 Average	4.04 Average	5.33 High

…	…	…	…	…	…	…	…
Overall Score		2.22 Low	3.23 Average	2.56 Low	3.21 Average	4.07 Average	5.34 High

6 SUMMARY

"The Internet is changing the way we work, socialize, create and share information, and organize the flow of people, ideas, and things around the globe. Yet the magnitude of this transformation is still underappreciated."

If we can capitalize on the very real potential the VLE has to transform educational pedagogy at our school and ensure that the teachers are motivated to embrace new ideas and methodologies, we will be in a position of having our school identified as the school for excellence in not only ICT but in forward-thinking, innovative and creative education. We will be delivering the very best education to our students in a context that fits 'their world' and equipping them with the essential skills for their future in the 21st century.

The implementation strategy presented in this paper is not necessarily fit all the school's environments, cultures and climates. Here, we only provide the guidelines and examples based on our VLE Success Model, and thus, the further adjustments are required to cope with the respective disparities. Nevertheless, this implementation strategy should be the basis for every school to ensure the successful implementation of Frog VLE in Malaysia.

"For tomorrow belongs to the people who prepare for it today"

7 PRACTITIONER'S VALIDATION

a) Do you refer to any 'Implementation Strategy' or 'Strategic Planning' for your school's VLE implementation?

YES ☐ NO ☐

a1. If **YES**, How do you get it? Please tick (/).

- Developed by school's management ☐
- Adopt from external sources (e.g. Internet, other schools etc.) - Without modification ☐
- Adapt from external sources (e.g. Internet, other schools etc.) - Modified to suit the school's environment ☐
- Others (Please mention) ☐

_____

_____

b) Do you think that this Implementation Strategy is practical for VLE implementation in school?

YES ☐ NO ☐

c) Can VLE Success Model be used as a guideline for Frog VLE implementation?

YES ☐ MAYBE ☐ NO ☐

d) Comments or suggestions.

_____

_____

_____

School/Department: _____

Name: _____

Position: _____

Signature: _____ Date: _____

Official Stamp:

Appendix I_2

Analysis for Practitioners' Validation

a) Do you refer to any 'Implementation Strategy' or 'Strategic Planning' for your school's VLE implementation?

* *This question is answered by practitioners in schools only.*

Practitioner	School	Post	Answer
A	SK Brinchang	Frog Administrator	No
B	SK Menson	Frog Administrator	Yes
C	SK Menson	Headmaster	Yes
D	SK Lemoi	Headmaster	Yes
E	SK Lemoi	Administrative Asst. Principal	Yes
F	SK Lemoi	Frog Administrator	Yes
G	SMK Sultan Ahmad Shah	Frog Administrator	No
H	SMK Sultan Ahmad Shah	Principal	No
I	SK Telanok	Administrative Asst. Principal	No
J	SK Telanok	Headmaster	No
K	SK Telanok	Frog Administrator	No

YES	School		NO	School	
Response	*f*	%	Response	*f*	%
5	2	40	6	3	60

**Total schools - 5, Total Response - 11*

YES - How do you get it?	
Develop by school's management.	-
Adopt from external sources - without modification	1
Adopt from external sources - modified to suit the school's environment	1
Others	-

b) Do you think that this Implementation Strategy is practical for VLE implementation in school?

No	Practitioner	Dept	Post	Answer
1	L	PPDCH	Frog Coach (Champion School)	Yes
2	M	PPDCH	ICT Coordinator	Yes
3	N	PPDCH	Frog Coach (1BestariNet)	Yes
4	A	SK Brinchang	Frog Administrator	Yes
5	B	SK Menson	Frog Administrator	Yes
6	C	SK Menson	Headmaster	Yes
7	D	SK Lemoi	Headmaster	Yes
8	E	SK Lemoi	Administrative Asst. Principal	Yes
9	F	SK Lemoi	Frog Administrator	Yes
10	G	SMK Sultan Ahmad Shah	Frog Administrator	Yes
11	H	SMK Sultan Ahmad Shah	Principal	Yes
12	I	SK Telanok	Administrative Asst. Principal	Yes
13	J	SK Telanok	Headmaster	Yes
14	K	SK Telanok	Frog Administrator	Yes
TOTAL: YES = 14 (100%), NO = 0 (0%)				
TOTAL PRACTITIONERS: PPD = 3, Schools = 11				

Frog Admin	Headmaster	Frog Coach	ICT Coordinator	Admin. Asst. Princ.	Principal	TOTAL
5	3	2	1	2	1	14

c) Can VLE Success Model be used as a guideline for Frog VLE implementation?

No	Practitioner	Dept	Post	Answer
1	L	PPDCH	Frog Coach (Champion School)	Yes
2	M	PPDCH	ICT Coordinator	Yes
3	N	PPDCH	Frog Coach (1BestariNet)	Yes
4	A	SK Brinchang	Frog Administrator	Yes
5	B	SK Menson	Frog Administrator	Yes
6	C	SK Menson	Headmaster	Yes
7	D	SK Lemoi	Headmaster	Yes
8	E	SK Lemoi	Administrative Asst. Principal	Yes
9	F	SK Lemoi	Frog Administrator	Yes
10	G	SMK Sultan Ahmad Shah	Frog Administrator	Yes
11	H	SMK Sultan Ahmad Shah	Principal	Yes
12	I	SK Telanok	Administrative Asst. Principal	Yes
13	J	SK Telanok	Headmaster	Yes
14	K	SK Telanok	Frog Administrator	Yes

TOTAL: YES = 14 (100%), NO = 0 (0%)						
TOTAL PRACTITIONERS: PPD = 3, Schools = 11						
Frog Admin	**Headmaster**	**Frog Coach**	**ICT Coordinator**	**Admin. Asst. Princ.**	**Principal**	**TOTAL**
5	3	2	1	2	1	14

d) Comments and suggestions (Open-ended)

Pract.	**Response**	**Code**
A	*Sesuai dijalankan di sekolah yang mempunyai kemudahan internet.* (Suitable to be implemented in the schools with internet facilities).	2
B	*Aktiviti seumpama ini amat sesuai dilaksanakan di sekolah yang mempunyai kemudahan internet*. (This kind of activity is very suitable to be implemented in the schools with the internet facilities).	2
C	School can't use all the time of VLE because line is limited in rural area. (School cannot use the VLE all the times of VLE because of the limited access in rural area)	2
D	The implementation strategy can help the teacher in teaching Frog VLE. It is good and suitable to use in school.	1,3
E	*Bersesuaian dengan keperluan sekolah dan dapat membantu guru.* (Meet the school's requirement and can assist the teachers).	3
F	*Baik.* (Good).	3
G	Frog VLE has been successfully conducted in many schools in Malaysia. Further research and enhanced VLE models can bring significant impact to the implementation of Frog VLE in malaysian schools.	3
H	*Sesuai dijadikan sebagai panduan di sekolah.* (Suitable to be used as guideline in school)	1,3
I	*Pelaksanaan boleh dilaksanakan di sekolah.* (Implementation can be implemented in schools).	1
J	Suitable for students and teachers (as a reference).	3
K	*Disokong. Sesuai dijadikan panduan di sekolah.* (Supported. Suitable to be used as a guideline in schools).	1,3
L	*Disokong. Amat sesuai dipraktikkan di sekolah kerana dibina berdasarkan kajian empirikal.* (Supported. It is very practical in schools because it is developed based on empirical study).	1,3
M	Suitable for school management in Frog VLE implementation in classroom.	1
N	*Boleh dijadikan panduan untuk pelaksanaan di sekolah.* (Can be a guideline for the implementation in schools).	1,3

Theme	**Code**	***f***	**%**
Suitable to be implemented.	1	7	37%
Suitable to be implemented if the school has the Internet connection.	2	3	16%
Positive impacts on implementation by providing guideline to teachers	3	9	47%
	Total	19	100%