Development of Web Application for Learning Management Supervision in Basic Schools in Thailand

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This present study aimed to develop a web application for learning management supervision in basic schools, and investigate the satisfaction towards the web application for learning management supervision in basic schools. Five experts in the former stage evaluated the web application. Meanwhile, in the latter, the one-shot case study was utilised to collect the data, and 30 teachers and administrators in a basic school were participants. Basic statistics were employed to analyse the data. The results found that the quality of the site was at a 'good' level (M=4.10, S.D.=0.18). Also, the satisfaction towards the site was at a 'good' level (M=4.29, S.D.=0.73). To conclude, this online platform was suitable for supervisors and supervisees to use. It could facilitate the users to save time and meet individuals' needs.

Keywords: *Web application, Learning management supervision, Supervision.*

Introduction

In the twenty-first century era, paradigm shifts in global trends have changed swiftly due to technology disruption. This has occurred in manufacturing, starting from the first industrial revolution (mechanisation through water and steam power), and technology has evolved to the second revolution (Industrial 2.0), wherein electricity was used as the primary source of the mass production. The third stage was the age of computer adoption (Industrial 3.0), and the fourth stage is called the Industrial 4.0, which enhances the potentials of computers to be smarter and autonomous, and is fueled by data and machine learning (Marr, 2018). This occurs not only in manufacturing, but also in the technology that has been applied to a vast array of fields. Raw data has been collected, synthesised, and digitalised to be digital information. Therefore, information technology allows people to exchange their thoughts, knowledge,

interests, etc., in a split second. Hence, it leads to the era of a learning society, that every curiosity can be fulfilled with just a few clicks on a computer screen. Also, in the teaching and learning fields, every educational organisation needs to change and adapt their learning management methods to be up to date with the technology for teachers and educators. This is the same as learners must possess a mobile device that allows them to be able to connect to the Internet and access significant amounts of information. Consequently, teaching and learning methods must be changed too. That is, the focus should be more on learners as the centre of learning (student-centred learning), and be more active or it is called 'active learning', rather than 'passive learning' (National Education Commission, 1999).

Furthermore, the number of users of information technology and the internet in the present day have leaped. People communicate with each other through smartphones or mobile devices, and therefore learning is not limited to being only classroom-based anymore. Thereby, there are many ways to learn and be educated through mobile devices (Enakrire, 2019). Besides, managing a school needs to adapt information technology to increase the effectiveness of teachers' performances (He, 2020). Especially, the heart of education quality, including the academic management and supervision which assists teachers to develop learners as society desires (Stokes, 2008).

However, the traditional supervision is the face-to-face supervision style. The pros and cons are that supervisors and supervisees can meet and have high interactions, but it takes time to carry on, while other supervisees need the supervisors' aids. The other one is regarded as 'online supervision', using the internet and online platforms to supervise (Stofle & Hamilton, 2008).

Levin and Waugh (1998, in Alger & Kopcha, 2009) studied information technology and the development of pre-service teachers. They pointed out that technology can optimise cognitive apprenticeships in teacher preparation. Similarly, Joia (2001, ibid.) also suggested that experts could foster learning for teacher preparation. As a result, information technology allows communication improvement between expert and novice teachers. Consequently, online platforms can be adopted and used to facilitate supervisors and supervisees as well. Therefore, the purpose of this study is to develop a web application for supervising learning management in basic schools in Thailand, and is based on the System Development Life Cycle (SDLC) adapted from Lorsuwannarat (2017), Kenneth and Kendall (2005), and O'Brien (2007). Also, it is to ensure that the performance of the instructions of teachers will be taken care of and supported.

Objectives

1. To develop a web application for supervising learning management in basic schools.
2. To investigate the results of using the web application for supervising learning management in basic schools.

Literature review

Basic principles of supervision

In education, the term 'supervision' refers to a guided process of how to perform a proper instruction to learners. Generally, it is between someone who has mastery in particular skills to one who possesses fewer experiences (Collins & O'Brien, 2012). It involves schools and teachers and one of the outcomes is to enhance the teaching potentials of teachers. There are five steps in supervision: problem identification, diagnosis, planning, implementation, and evaluation (ibid.).

Consistent with Acheson and Gall (2003: 3), Spears (1967: 16), Harris (1985: 10), and Jeizan (1999: 8), supervision is a process of aiding and supporting teachers and administrators to enhance their performances to reach the goals of learners' quality.

Besides, Adams and Dickey (1966: 1), Burton and Brueckner (1977: 1), and Spears (1969: 119) proposed similar supervision principles for supervisors to follow and adapt, based on individual contexts as follows:

1. *Democracy*: it is to implement the philosophy and theories, including mutual trust, co-operation, mutual respect, and method of intelligence, to make a decision or consider any issues in supervision jobs.
2. *Science*: supervisors need to utilise an appropriate way which is suitable for particular supervisees. Supervisors are just a facilitator who should promote a scientific method in developing teaching and learning.
3. *Creativity*: supervisors should select or create methods creatively which encourage supervisees to change and be successful.
4. *Leadership*: supervisors should develop supervisees to be a leader or an active doer rather than a passive follower.
5. *Communication*: supervisors are a developer and a coordinator who connects stakeholders to work together.

To conclude, the principles of supervision are significantly important, that supervisors should adhere to and help teachers and administrators to reach the learners' quality goals. The supervisor can be a teaching performance evaluator who points out the actual teaching performances, then guides and gives suggestions for improvement to meet the ideal teaching behaviour. On the other hand, supervisors can be an instruction consultant or facilitator. Rather than pointing out the actual teaching performances, aspects of teaching will be discussed. Also, reflection and self-observation will be utilised to help teachers undertake self-development (Richard & Schmidt, 2010).

Web application development

The web application can be accessed by anyone and used for a wide variety of purposes (Rouse, 2019). It refers to the web-based application or program that is available online. No additional programs are required to be installed. Users only require a web browser interface to access it (Rouse, 2019; Alsadoon, 2018). What is more, multiple users can access the same web application at the same time, and it is friendly to different devices, including desktop, laptop, or mobile devices (Rouse, 2019). The web application provides services as a request from a client through a communication protocol, e.g., HTTP. The results will be in HTML documents. It needs a particular language, such as ASP, PHP, ASP, .NET, C#, etc., to create a web application (Sompanit, 2006; Aljraiwi, 2017).

There are different ways to develop a web application. Lorsuwannarat (2017) said that large organisations usually use the so-called 'Traditional System Development Life Cycle' (TSDLC) to develop their online platforms, which is based on four principles: prototyping, end-user development, outsourcing, and application software package. The stages are as follows: 1) system investigation, possibilities of users' behaviour and economical success; 2) system analysis, problems or limitations within organisations that need to be fulfilled by the developing web application; 3) system design, how the web application works; 4) testing; 5) implementation; 6) operation; and 7) maintenance.

Besides, Sawangwan (2019) suggested six steps that can be adopted to develop the web application, as follows: 1) project definition or a problem or issue identification stage to seek a new system to solve that problem; 2) system study or problems analysis stage; 3) design or how to solve the problem and what should be done with the web application; 4) programming or web application development stage; 5) installation of the web application; and 6) post-implementation or a stage that users and experts evaluate the effectiveness of the developed web application.

Kenneth and Kendall (2005) proposed seven steps to develop a web application. They are problem identification, analysis, design, development, testing, implementation, and maintenance and further development. Besides, O'Brien (2007) said that it can be developed by surveying problems, analysing, designing, installing, and testing the developed web application.

In this study, it adapted the SDLC based on Lorsuwannarat (2017), Sawangwan (2019), Kenneth and Kendall (2005), and O'Brien (2007). There are four stages as follows:

Stage 1: System analysis
Stage 2: System design
Stage 3: System development

Stage 4: Implementation and Testing

Related studies

Chinnasri and Wasukree (2015) developed a web application to analyse multiple-choice test items and evaluated the performance of the web application and users' satisfaction towards the site. There were two parts in the developed web application: test results checking, and the analysis of the results using PHP language for programming. The performance of the web application was found to be at a very high level, as well as the satisfaction. More importantly, the web application was user-friendly and can be accessed without any additional software installation.

Saekow (2015) developed a knowledge management web application on mobile phones for undergraduate students, the results of the use of the web application, and students' satisfaction with the web application. The results revealed that the quality of the web application for knowledge management for undergraduate students was at a 'good' level. The results of the use of the web application were based on five criteria, including the designing process of the Computer Assisted Instruction (CAI); the compositions of CAI; the elements of the web application; colours and feelings based on psychological theory; and the infographics, which were at a 'very good' level. More importantly, the participants were satisfied with the web application at a 'good' level.

Könings, Popa, Gerken, Giesbers, Rienties, Vleuten, and Merriënboer (2016) studied the barriers that delay the development or progress of supervision on the basis that online supervisory group meeting with a VDO conference contributes great benefits to supervision and supervisees. The participants were students at the tertiary level in home and abroad institutions. There were two studies in the study. In study one, it was found that when compared with students staying at the home institution, students who studied abroad perceived lower-quality supervision and feedback on all measured aspects. In study two, it was a quasi-experiment study. The results showed that online meeting participants experienced better supervision than those who were abroad without online meetings. Also, they were perceived as equally positive towards supervision, as students who stayed at the home institution. The findings stress the great potential of videoconferencing in optimising distance supervision. Besides, the need for extra support for students during their study abroad should be managed.

Conceptual framework

The conceptual framework was adapted from Oliva (2005), Kotter (2017), and Rourke and Kanuka (2007), as shown in Figure 1.

Figure 1. Conceptual framework

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┌─────────────────────┐              ┌─────────────────────┐
│                     │              │                     │
│   Web application   │    ═══▷      │  The web application│
│ for learning        │              │ quality & satisfaction│
│ management          │              │                     │
│ supervision in basic│              │                     │
│ schools             │              │                     │
│                     │              │                     │
└─────────────────────┘              └─────────────────────┘
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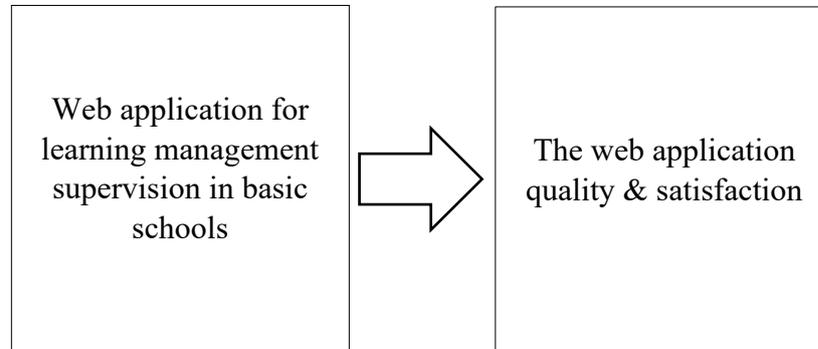
Methodology

In this study, there were two phases: web application development for learning management supervision in basic schools, and web application evaluation. Questionnaires were utilised to gather data in this stage.

Phase 1: A web application development for learning management supervision in basic schools

The author created a web application using the system development life cycle (SDLC) as the principle to develop the web application. Then the author asked five experts, in the field of information technology, to evaluate the web application using the web application for learning management supervision evaluation criteria. The web application development procedures were as follows:

1. Problem determination

1.1 Investigated the current problems by reviewing related studies concerning supervision in basic schools.
1.2 Reviewed literature related to the problems, including supervision theories and LMS.
1.3 Collected the problems, constraints, and suggestions.

2. Analysis

It was found that there were some constraints of the LMS when the results display on a mobile device. In other words, the contents could not show all the details on the screen because the LMS was not designed to be responsive to web design. Therefore, when the LMS runs on a mobile device, parts of the content will not appear.

3. Web application design

The author synthesised the analysis results and designed the web application for mobile devices using LMS structures as the model of development. Teachers could study those devices including texts, videos, homework, tests, and check scores on the application at any time. Meanwhile, administrators were able to add or remove content, provide reflections, and evaluate teaching performances through the web application.

Figure 2. How to supervise using the web application
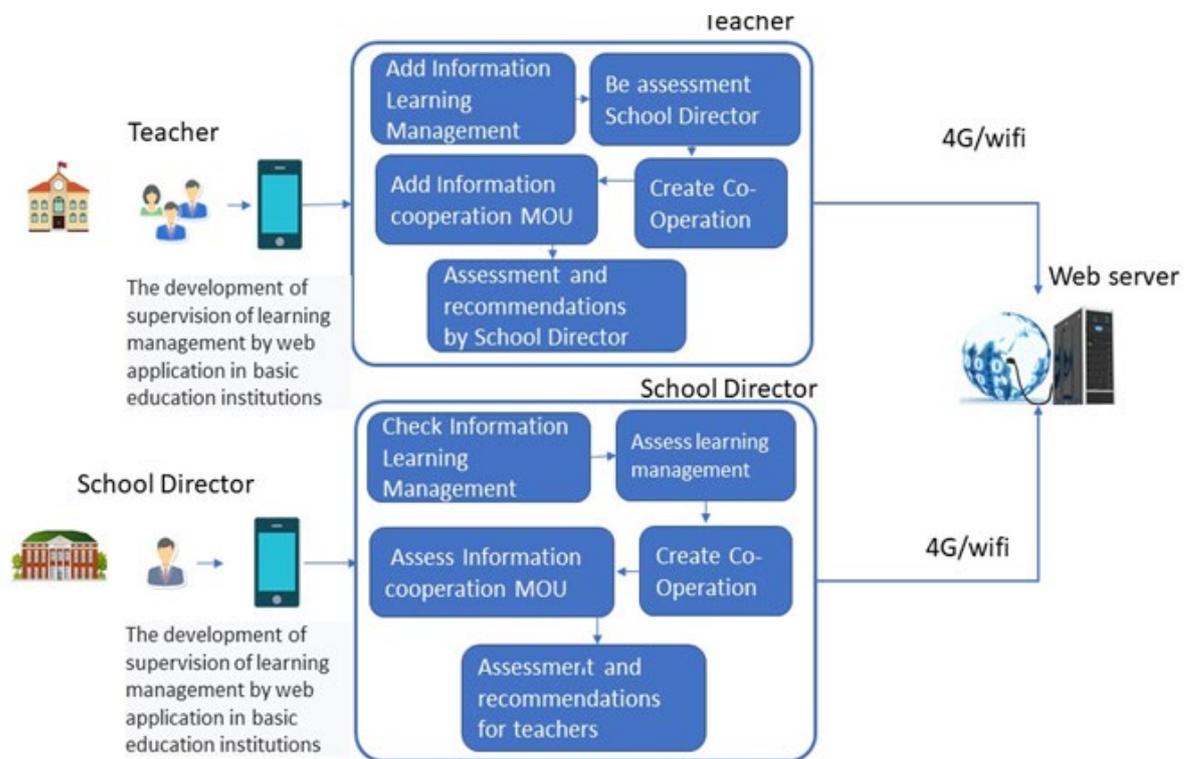
4. Web application development

The developed web application was a hybrid application that was created based on HTML5, CSS3, and JavaScript (jQuery Mobile Framework). PHP and MySQL languages were used to store the data. Program codes were then transformed to be a mobile device application, using the Adobe Phone Gap Build.

Figure 3. The web application for learning management supervision homepage
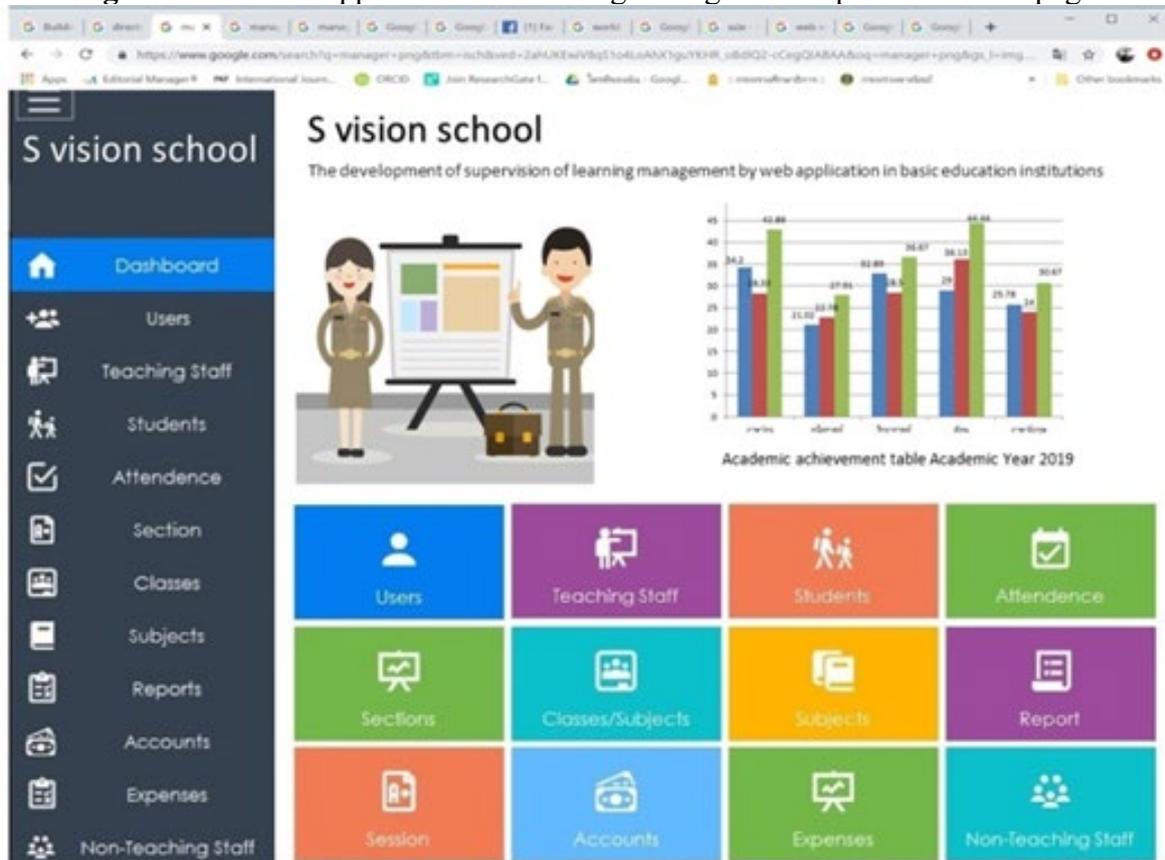
Data collection

In this stage, the author created a five-level Likert-scale questionnaire to evaluate the validity of the web application. The scales were as follows: 1 for 'very poor', 2 for 'poor', 3 for 'fair', 4 for 'good', and 5 for 'very good'. The questionnaires were then sent out to five experts in the field of web development and supervision to evaluate the web application and gain their comments and suggestions.

Data analysis

The data gained from the experts was collected and analysed to check the validity and quality of the web application for learning management supervision in basic schools. The author then improved the site based on the results of the questionnaires. In this stage, basic statistics were utilised to analyse the data, including the mean, and standard deviation.

Phase 2: The investigation of the results of using the web application for supervising learning management in basic schools

Having created a web application, the author employed the one-shot case study (Wongrattana & Naiyapat, 2017) to collect the data. Thirty teachers and administrators from a basic school under the Buriram educational service area office III were asked to access the web application. The questionnaires were distributed and the respondents rated their satisfaction towards the site.

Figure 4. One-shot case study design

X: refers to the use of the web application for learning management supervision in basic schools.

O: refers to an evaluation after the use of the web application for learning management supervision in basic schools.

Data collection

The data was collected in 2020 by sending out the online questionnaires to 30 teachers and administrators in a basic school after they accessed the site and used it for the supervision activities. The participants evaluated the site based on their perceptions and satisfaction towards the web application. The questionnaires used a five-level Likert-scale. The scales were as follows: 1 for 'very poor', 2 for 'poor', 3 for 'fair', 4 for 'good', and 5 for 'excellent'.

Data analysis

The data gained from the participants were collected and analysed to check the users' satisfaction with the web application for learning management supervision in basic schools. Then the author improved the site based on the results of the questionnaires. In this stage, basic statistics were utilised to analyse the data, including the mean (M), and standard deviation (SD).

Results

1. From Table 1, the results of the evaluations from the experts found that the quality of the web application was at a 'good' level (M=4.10, SD=0.18). When considering each aspect, it was found that the propriety standards were at a 'good' level (M=4.23, S.D.=0.68), the accuracy standards were at 'good' level (M=4.23, SD=0.22), the

feasibility standards were at a 'good' level (M=4.00, SD=0.59), and the utility standards were at a 'good' level (M=3.95, SD=0.14), respectively.

Table 1: Mean and standard deviation of the quality of the web application evaluated by experts

Topic	M	SD	Meaning
Propriety Standards			
1. The layout of the content is appropriate, clear, and easy to understand.	4.14	0.38	high
2. The content has a consistent order and is related to each other.	4.14	0.38	high
3. The site shows how to solve unresponsive or other problems.	4.42	0.53	high
Total	**4.23**	**2.22**	**high**
Feasibility Standards			
1. The site meets the needs of users.	4.00	0.00	high
2. The system is not complicated and is user-friendly.	3.57	0.78	high
3. The site is worth operating.	4.42	0.53	high
Total	**4.00**	**0.59**	**high**
Utility Standards			
1. The system has a system guideline so that users can learn how to use it by themselves.	4.14	0.38	high
2. Symbols, images, and characters are placed in an appropriate location and are easy to understand.	4.14	0.38	high
3. Users can set their password or authentication to secure their identities.	3.57	0.78	high
Total	**3.95**	**0.14**	**high**
Accuracy Standards			
1. Data is kept accurately and securely.	4.14	0.38	high
2. The system has a comprehensive search for overview data.	4.42	0.53	high
3. The system is accurate in calculating the results.	4.14	0.38	high
Total	**4.23**	**0.22**	**high**

2. As shown in Table 2, the results of the evaluations from the teachers and administrators found the site was at a 'good' level (M=4.29, SD=0.73). Also, every aspect of the site was at a 'good' level, as follows: functions of the site (M=4.36, SD=0.13), meet the needs of users (M=4.30, SD=0.28), and user-friendliness (M=4.25, SD=0.26), respectively.

Table 2: Mean and Standard Deviation of the satisfaction towards the web application for learning management supervision

Topic	M	SD	Meaning
Meet the needs of users			
1. The ability of the system to manage users	3.89	0.32	high
2. The ability of the system to manage data	4.58	0.82	very high
3. The ability of the system to show results	4.24	0.73	high
4. The ability of the system to notify users	4.49	0.67	high
Total	**4.30**	**0.28**	**high**
Functions of the site			
1. Accuracy in importing data	4.39	0.46	high
2. Accuracy in data search	3.78	0.61	high
3. Accuracy in updating information	4.29	0.78	high
4. Data correctness	4.61	0.49	very high
5. The accuracy of the results obtained from processing in the system	4.80	0.50	very high
6. The accuracy of the results in the report format	4.40	0.68	high
7. The speed of the processing of the system	4.09	0.83	high
8. System reliability	4.68	0.47	very high
9. The practicability of the system and real situations	4.36	0.68	high
10. Prevention of errors that may occur	4.16	0.99	high
Total	**4.36**	**0.13**	**high**
Users friendliness			
1. Easiness of using the system	4.19	0.82	high
2. Appropriateness in choosing the font type on the screen	4.30	0.66	high
3. Appropriateness in choosing the font size on the screen	4.20	0.62	high
4. Appropriateness in using the colour of text and images	4.20	0.90	high
5. Appropriateness in using text to describe the meaning	4.10	0.85	high
6. Suitability in using symbols or images to convey meaning	4.20	0.61	high
7. The same standard in screen design	4.24	0.56	high
8. Suitability for interaction between supervisors and supervisees	4.10	0.71	high
9. Appropriateness of positioning of components on the screen	4.53	0.50	very high
10. The vocabulary used is familiar and can be easily followed	4.42	0.67	high
Total	**4.25**	**0.26**	**high**

Discussion

1. The quality of the web application for learning management supervision was at a 'good' level. Also, when considering each topic, it was found that all the topics were at a 'good' level. The highest points went to the appropriateness and correction, and the lowest were the possibility, and usefulness, respectively. This may indicate that the development of the web application was not very intricate. Also, the site was user-friendly. In line with this, Suebsaitong (2017), and Watchararat (2018) also revealed in their different studies that a high quality of web applications led to the effectiveness of particular jobs or purposes of the site.

2. Regarding the satisfaction towards the web application of the participants, it was found that it was at a 'good' level. Interestingly, there were no topics which were lower than the 'good' level. The function of the web application was rated at the highest point and was followed by 'meet the needs of users', security, and user-friendliness, respectively. It was evident that the site met the needs of the users. Besides, the functions within the sites were easy to use and access.

Conclusion

To conclude, based on the experts, the web application for learning management supervision in basic schools was suitable for supervisors and supervisees to access as a platform to supervise and to be supervised online. Similarly, the participants also felt satisfied with the platform. The results indicated that the web application could be used as a tool for both supervisors and supervisees to interact with each other more individually. The limitations of distance and time will be minimised, and it will lead to the improved teaching performances of the teachers.

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