A PROTOTYPE SYSTEM FOR GENERATING LESSON PLANS FOR SECONDARY SCHOOL TEACHERS

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ABSTRACT

The Ministry of Education (MOE) Malaysia directed that every teacher of secondary schools is responsible to prepare lesson plan for each lesson when teaching in a class. The paper reports the use of a prototype system by school teachers to produce digital lesson plans. The system was developed utilising the ADDIE Model. Five teachers from Kian Kok High School, Kota Kinabalu, Sabah was selected to test-run the system. The results of the interview were analysed in a qualitatively way. The findings showed that all the 5 subjects agreed the system was able to function smoothly to create digital lesson plans. Many other functions were tested and also reported to be successful. There were many challenges were reported by the subjects but the researcher was only managed to attend to some of them due to financial constraints of the grant. The research concluded that lesson plans generator that is reliable and effective must be in the online mode in the future so that users can access more teaching resources.

Keywords: ADDIE Model, digital lesson plan, lesson plan generator, system test-run

INTRODUCTION

Teachers are responsible prepare lesson plan each time they enter a classroom as far as MOE is concerned. This directive is compulsory and teachers must be armed with lesson plans, teaching aids and assessment activities for effective teaching and learning in classroom teaching. Without a lesson plan, teachers may be in a total loss of direction and ideas when entering a class. If a teacher fails to plan the teaching tasks, students will lose focus and concentration during the lesson. Lesson plan states learning goals, individual or group activities, from set induction until the closing (summary) including reflection (Richards & Bohlke, 2011)

Writing digital lesson plan via technology will direct students towards quality teaching and learning outcomes (Wilfred, 2016). This is because the use of internet will improve the quality of lesson planning. Retention of knowledge, attention and motivation in learning can be achieved if a good quality lesson plan is unveiled and implemented (Ozdamli & Uzunboylu, 2014). This research will present the perceived perceptions of some teachers regarding the use of this prototype system, the lesson plan generator. The research questions are:
1. What is users' perceived satisfaction regarding the interfaces of the system?
2. What are users' opinions regarding the functionalities of the following:
    - Data input session
    - Lesson plan generator
    - System sort functions: lesson plans according to date, time or subject, etc.
3. What are users' challenges while using the system?

LITERATURE REVIEW

Importance of Digital Lesson Plan

Globally, lesson plan is important for every teacher. For example, China teachers use lesson plan to measure teaching and learning and also do personal reflection after each lesson (Shen et al., 2007). It is considered as a responsibility for every teacher in China to use the lesson plan tool to achieve excellence in teaching and learning. In a university, lesson plans together with course-based reflection will enable colleagues in the same program to share thoughts, experiences and collaborate more effectively to ensure positive students' engagement and achievement. Comparatively, the Chinese teachers seriously focus on course reflections for improvement whereas the American teachers reflected only after 7 – 8 hours of teaching (Su et al., 2005). This demonstrated the importance of the lesson plans for China teachers.

The lesson planning process usually starts from the semester level until the unit level. Topical mapping in a semester is first done before the unit level's lesson plan commences. Some of the important aspects in a unit lesson plan are:

- Defining goal or learning outcomes
- Sequential steps of teaching or inputs by the teacher from set induction up to the activities of the students
- Evaluation (assessment) for students
- Reflection

In this research, preparing lesson plan is done using the same practice and approach with the help of the technology tool. Teachers were encouraged to prepare digital lesson plans. Digital lesson plan is actually similar to the physical lesson plan but it is in digital format which can be stored on an online platform, CMS/LMS etc. The offline mode version is stored in a localised computer Server or installed software that has a database (Bomar, 2014). In this research, the offline system was chosen due to limited grant funding. The offline database system that can also be installed in any localised computer Server.

Having a digital lesson plan benefitted teachers in many ways in an education 4.0 environment (Ahmad Sugianto, 2020). For example, resources from internet such as activities required for 21st century skills, higher order thinking and creativity are widely available on the web. The implementation of a good quality digital lesson plan will create effective teaching and learning outcomes (Bialik & Fadel, 2015). Therefore, teachers are encouraged to use digital lesson plan as much as possible. This research is designed to involve many teachers to create good quality lesson plans.

RESEARCH METHODOLOGY

Method

This research is qualitative in nature. It uses the interview method to for data collection. According to Shaughnessy et al. (2011), in an interview, discussions with the subjects would be held to deeply explore a specific topic to collect information. Interview is often used to assess thoughts, opinions, feelings and perceptions on any behavioural construct (Gravetter & Wallnau, 2015). This research employs the group focus interview to collect data from the subjects.

Sample

The implementation of this prototype system was affected by the on-going Covid 19 pandemic declared by WHO in February 2020. Consequently, travels restrictions and movement control

were implemented by the government which affected the education sector badly. Due to this factor, only five teachers were selected as subjects for a trial run of the prototype system.

The test-run was designed to ensure all functionalities of the system run smoothly to generate digital lesson plans. All subjects attended a briefing to demonstrate the step-by-step approach to create a lesson plan using the system. The researcher allowed a 1-month trial for all the subjects. At the end of month, the researcher conducted the interview to gather data on the subjects' satisfaction for the system including identifying issues related to the system.

Instrument

An interview protocol was prepared for the purpose of data collection. The group focus interview focused on the following questions:
1. What is your perceived satisfaction regarding the interfaces of the system?
2. What are your opinions regarding the functionalities of the following:
   - Data input session
   - Lesson plan generator
   - System sort functions: lesson plans according to date, time or subject, etc.
3. What are the challenges while using the system? Describe.

Data analysis

The interview produced qualitative data. The type of data analysis for the three research questions is shown in Table 1.

Table 1: Data analysis

Research Questions	Data Analysis Method
What is perceived satisfaction regarding the interfaces of the system?	Qualitative data: interview transcripts
What are your opinions regarding the functionalities of the following: • Data input session • Lesson plan generator • System sort functions: lesson plans according to date, time or subject, etc.	Qualitative data: interview transcripts
What are the challenges while using the system?	Qualitative data: interview transcripts

Development of the prototype system

The ADDIE Model is used in the development of this prototype system. The five phases of ADDIE are namely analysis, design, development, implementation and evaluation phases.

Analysis Phase:
In this phase, some teachers from the secondary schools were interviewed by the researcher. These teachers were Masters of Education (by coursework) students in UMS. They were interviewed on the various aspects and stages of writing lesson plan writing and its challenges. These initial analyses and understanding of lesson plans helped the researcher to prepare the data flow diagram and data structure of the database of the system.

Design Phase:

In this phase, the produced data flow diagram (DFD) helped to counter-check data flow issues. After a few rounds of discussions, the data structure or data dictionary for the database was finalised. The prototype system has two tables in its database. The first table is set as "*tbllessonplan*" while the second is "*tblpersonal*". Table "lesson plan" stores all the inputs regarding to the characteristics of a lesson plan while Table "Personal" has all the information of the owner of the lesson plan. Table 1 shows the data dictionary of "tbllessonplan".

Table 1: Data dictionary (Table lesson plan)

Field Name	Data Type
ID lesson	Number
Set Induction	Long Text
BBM Set Induction	Long Text
Presentation Stage	Long Text
BBM Presentation Stage	Long Text
Practice Stage	Long Text
BBM Practice Stage	Long Text
Production Stage	Long Text
BBM Production Stage	Long Text
Reflection	Long Text

All the fields are set as "long text" to enable multiple lines for users to key in paragraphs of information. Table 2 shows the data dictionary for "*tblpersonal*".

Table 2: Data dictionary (Table personal)

Field Name	Data Type
ID lesson	Number
Teacher's name	Short Text
Gender	Short Text
Day	Short Text
Date	Date/Time
Time	Short Text
Duration (minutes)	Number
Class	Short Text
Form	Short Text
Number of student	Number
Subject	Short Text
Topic	Long Text
LO	Long Text

The two tables store all the fields related the characteristics of a lesson plan. The primary key must be identified to unlock each lesson plan record. The database's primary key is set as "ID lesson" so that a relational database can be established to ensure data mining processes can be integrated. This will greatly enhance data integrity and solve the problem of data repetition.

Development Phase:
In this phase, the researcher identified a database management system (DBMS) for database development. This research is limited in term of grant funding and therefore the online database method (DB) cannot be considered because even the cheapest system that can be developed by a software house is estimated to be around RM50,000 (including the hosting for the online DB). As a result of the financial constraint, the researcher used DBMS system from MS Access that is part of the MS Office software that was officially subscribed by UMS. Although MS Access has its limitations but it can still host a DB that is on an offline mode. After three months, the final version of prototype system was finally ready.

Implementation Phase:
The implementation of the lesson plan generator for test-run was done in May 2022. Five teachers from Kian Kok High School, Kota Kinabalu were selected for the purpose. The results will be reported in the findings section.

Evaluation Phase:
The research will analyse and evaluate the findings of this phase in the findings section.

FINDINGS

After the five teachers from Kian Kok High School, Kota Kinabalu test-run the prototype lesson plan generator, they attended a focus group interview. The results of the interview will be highlighted in this section. The following is a screenshot of the main menu of the system (Figure 1).
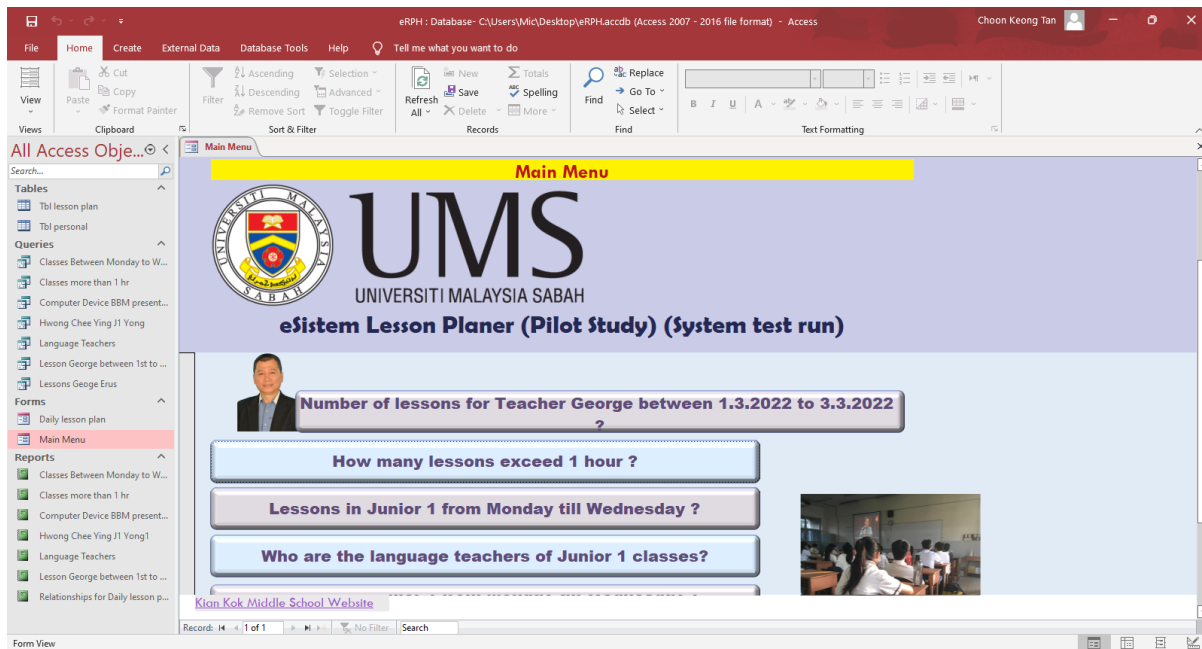
Figure 1: The main menu

The system was tested for the following functionalities:
- Data input session
- Lesson plan generator

- System sort functions: lesson plans according to date, time or subject, etc.

Research question 1: Satisfaction with the system interfaces

The five subjects answered the first interview question "What is perceived satisfaction regarding the interfaces of the system?" Four subjects answered "Yes" with some positive comments. The 1st and 2nd subjects agreed that "the interfaces and functions were user-friendly" because they can be clicked easily from the main menu. However, the 4th subject commented that "if the main menu can be re-arranged to see button such 'key in data', 'generate lesson plan', 'print lesson plan', etc. it will be better."

The researcher noted the comments of subject number 4. The system will be maintained and re-programmed to upgrade the main menu.

Research question 2: Functionalities of the system

The subjects were asked "What are your opinions regarding the functionalities of the system?". The functionalities of the system refer to the following:

- Data input session
- Lesson plan generator
- System sort functions: lesson plans according to date, time or subject, etc.

Figure 2 displays the screen shot for inputting data for generating lesson.
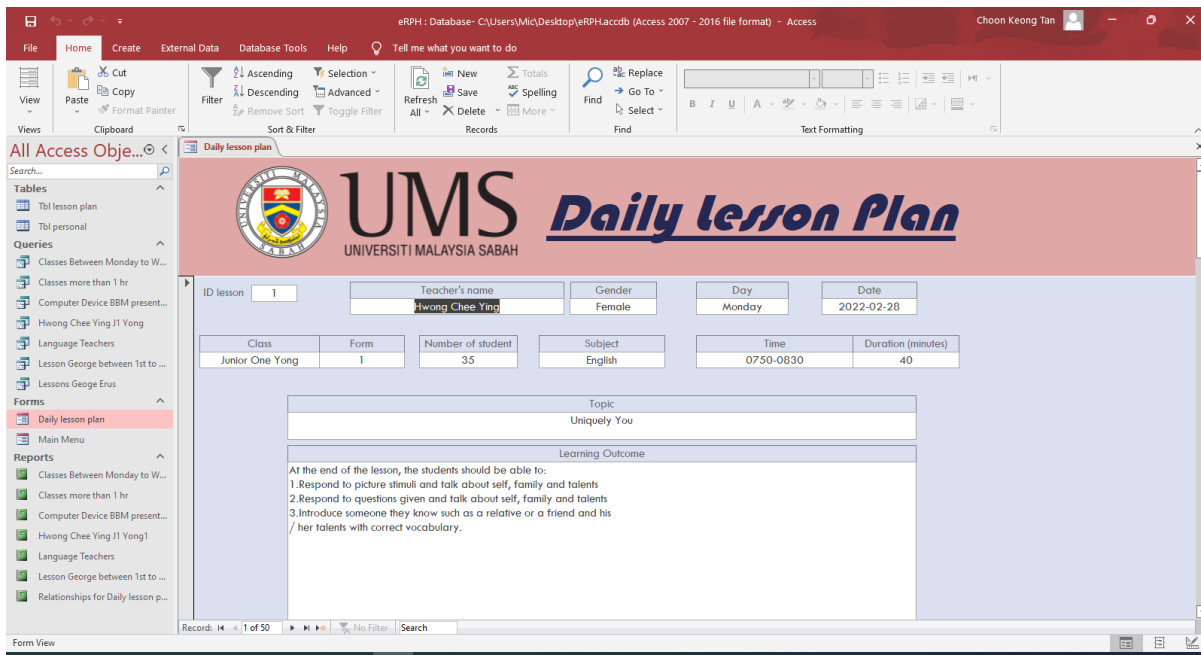
Figure 2: Form for keying in data for the lesson plan

All the five subjects agreed that the input form of the system is easy to use. However, they admitted that a huge amount of data is needed to be inputted into the system. Subject 3 commented "We are already burdened with so much of administrative work besides teaching; it's difficult to find extra time for this job". The 5th responded said this: "If the MOE really needs to implement this system data assistant is needed". The 1st subject however was more accommodating and commented "Although more time is needed to key in each lesson plan but the outputs can be everlasting before it can be stored for future references". The teachers said

they to plan the needed data (resources) much earlier before the data input session. For each lesson plan, if data is readily available to the teachers, an estimate of 15 minutes is needed to complete all the fields. Therefore, the researcher agreed with the subjects that data input for the system is very time consuming.

Figure 3 shows a sample lesson generated by the system. The lesson belonged to one of the subjects (Subject 5) whose name is "Teacher Hwong".

Figure 3: Sample lesson plan generated by the system

All the subjects were satisfied that the system was able to generate the lesson plans after keying in all the data. They were also delighted to know that the system allows each lesson plan to be printed. They commented this will help them fulfil the lesson plan responsibility required for each teacher that is enforced by MOE.

The system is also able to provide other functionalities such as sorting lesson plan by date, time or teachers as well as printing reports. For example, the system is able to display the number of lesson plans for teachers according to specific time or date. Figure 4 shows an

example of the sorting functionality of system. The result showed that between 1st of March and 3rd of March 2022, there were 11 lesson plans recorded in the system.
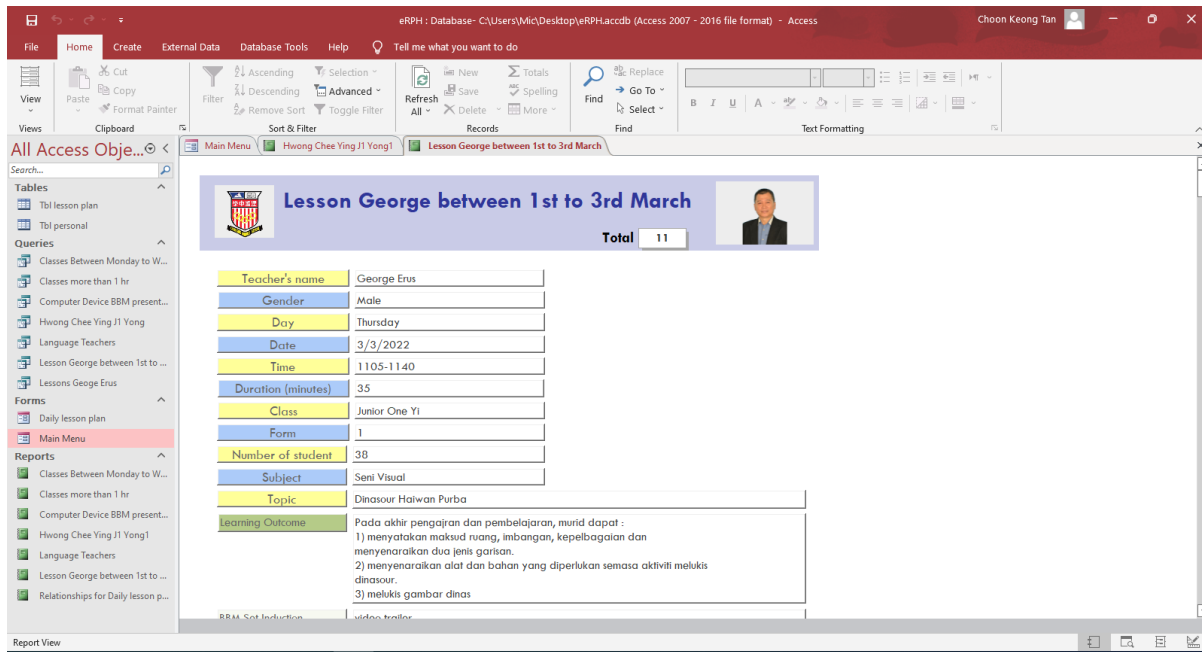
Figure 4: Lesson plans sorted according to date by the system

Another example of sorting in term of teachers by the system is for example by subject teachers. Figure 5 shows the result of the sort according to subject teachers; for example language teachers. It showed there were 30 lesson plans recorded by the system for language teachers of Junior 1 classes.
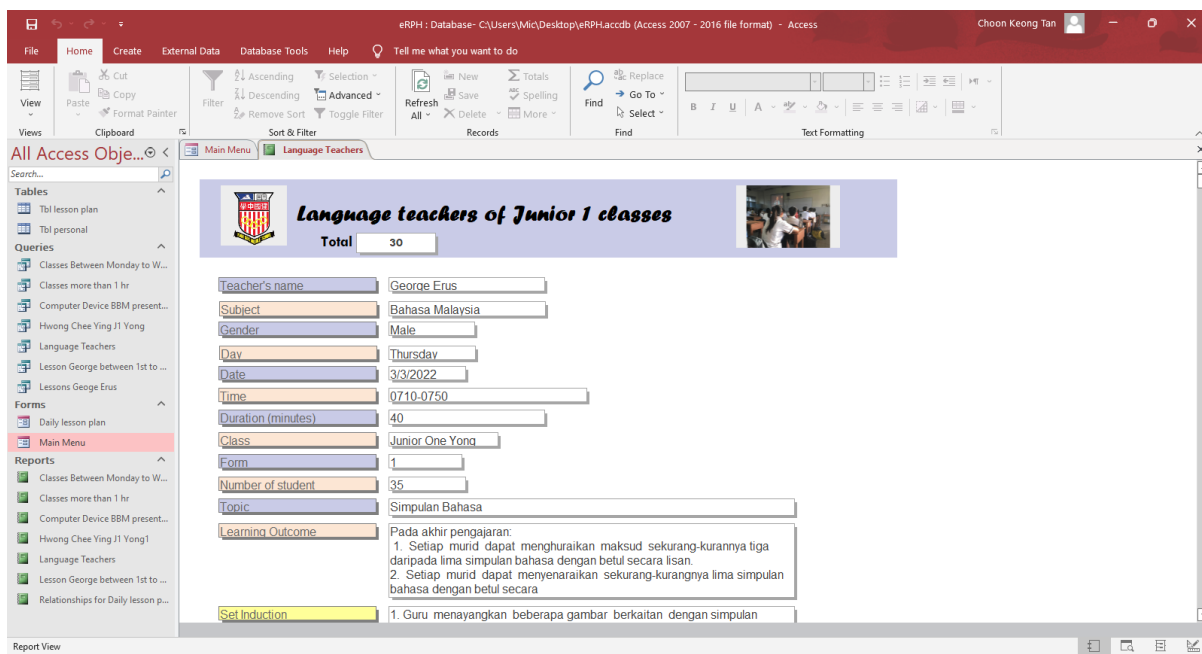

Figure 5: Lesson plans sorted by the system according to subject teachers

Generally, all the subjects' satisfaction on with the functionalities of the system were good. This finding is in agreement with other researchers (Shroff et al., 2011; Zacharis, 2012). These researchers stated that good quality system will enhance users' readiness to use the system. In addition, all subjects commended that the system was smooth sailing without much technical error. For example, each output with a click of a button took less than 3 seconds to generate an output. It can be considered as almost "immediate response". Every subject responded with "thumb up" as far as functionalities of the system is concerned.

Research question 3: Challenges of the system
For the last research questions, the subjects were asked "What are the challenges while using the system?". The subjects' answers and feedbacks were analysed and showed in Table 3.

Table 3: Challenges and solutions for system

No.	Challenges	Solution
1	Subject 1 and 3 complained that "Two forms are used to key in data for the lesson plan. Can they be combined?". They also commented that too many textboxes were used.	The researcher managed to combine the two forms into a single form utilising the "database relationship feature" and thus reduce the number of textboxes by 30%.
2	Subject 5 complained that the offline version (this present version) is less user-friendly because results from the database of each individual computer need to be re-combined back into a single DB.	No action was taken because it had been stated earlier that due to insufficient funding to this grant the online version could not be developed.
3	Subject 1 and 2 complained the main menu of the system of lacking in term of creativity.	The researcher will redesign the main menu to include UMS logo, school logo, related graphics, etc.
4	Subject 3, 4 and 5 voiced concern about database security issue as there is no password required.	The researcher will reprogram the system to include password for entering the system.
5	Subject 5 was worried if many schools are involved in the project later on, the database will not be able to cope with the amount of data.	The researcher responded that no action will be taken due to insufficient funding and unable to use corporate DB. As a result, the decision to continue with MS Access DB will be retained until the limitation is reached. Estimation: MS Access is able to accommodate 2000 users only (educational licence).
6	Subject 2 voiced out copyright issue. Who owns the copyright? The user or UMS? She said many users will refuse to provide data due to this problem.	The researcher's response was there is no solution in sight. As this is an UMS research, UMS retains the copyright to all the data therefore there is no action taken for this complaint.

Basically, all the inputted data was triangulated with the outputs of lesson plans. The teachers (subjects) were satisfied that they were able to witness the output of the respective lesson plan. The teachers were also happy that each lesson plan was outputted in a form of

printable version. To them, this is most satisfying.

In conclusion, the researcher is satisfied with the outcomes of the test-run of the prototype lesson plan generator. After reviewing all the feedbacks, the system was evaluated and corrected to the best the researcher can accommodate. According to Wilfred (2016), if a system did not do maintenance, in the end users' satisfaction and perceptions on the system will be affected. However, this system maintenance is a real challenge because the fund of this project is small.

CONCLUSION

Based on the findings gleaned from the subjects' feedback in this research, it is now proven that the prototype lesson plan generator is useful and has huge potential in helping the users in digital lesson plan creation. All of them were happy and hope for the continuation of the system to be implemented in more schools to gauge its usefulness.

All the findings proved the prototype system can be maintained as a reliable system for teachers to generate lesson plans. As Pena-Ayala et al. (2014) mentioned, a system that is fully supported by users must be upgraded to maintain its good quality to ensure its long run and usability. Therefore, the researcher would like to recommend this system to be used widely by schoolteachers. Due to its limitations regarding the scale of the system which is offline mode, the researcher recommends further study and improvement to the system. The university (UMS) must embark on a new project to upgrade this system to the online version to maintain its visibility and usability. This will enable more teachers from Sabah and the whole of Malaysia to enjoy using the system.

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