Applied Information Technology And Computer Science Vol. 3 No. 1 (2022) 417-433

AITCS

Homepage: http://publisher.uthm.edu.my/periodicals/index.php/aitcs
e-ISSN :2773-5141

A Development of E-Learning System for Standard 1 Malay Subject

See Tian Zhen[1]*, Nureize Arbaiy[1]

[1]University Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, 86400, MALAYSIA

*Corresponding Author Designation

DOI: https://doi.org/10.30880/aitcs.2022.03.01.028
Received 13 June 2021; Accepted 22 March 2022; Available online 31 May 2022

Abstract: The variety of online teaching aids and the lack of comprehensive methods to measure student performance due to limited time in class time cause problems for teachers. As a result, teachers should take the time and effort to tackle these tasks, especially to master these online teaching aids and focus on teaching and assessment. This challenge is the result of no centralized and specialized teaching aids to aid teaching. The content of online teaching aids available today is sometimes not in accordance with the standard syllabus provided by the Ministry of Education and there is no comprehensive evaluation analysis on student performance. Therefore, the effectiveness of the current teaching implementation is limited. Thus, an E-learning system for Malay Subject Year 1 of primary school developed to help diversify learning tools. This project uses the Prototype Model as a methodology and system design based on structured methods. The programming languages used to develop the system are PHP, Javascript, JQuery, and SQL. The system allows students to learn Malay subject through playing quiz, ease the workload of teachers by automatically marking all quiz and provide assessment on the result of all played quiz by students. The system users are student, teacher and administrator. At the end of this project, a fully functional system is expected to help the teaching and evaluation process of student performance.

Keywords: Malay Subject, E-Learning, Web-Based System, Structured-Based

1. Introduction

Online teaching is a course conducted through an online method, which means all lectures, tutorials, or laboratories are delivered entirely online. There are no physical or on-campus class sessions. Teaching aids are provided to aid teaching such as Google Classroom [1] which allows students to view teaching materials uploaded by teachers, submit assignments, take exams, do exercises and so on. Whereas software such as Google Meet or Zoom provides virtual interaction aids for live online learning. There are also game-based learning apps like Kahoot [2] and Quizizz, which allow students to play game and learn at the same time. These online games help teacher by allow the student to have fun while learning, which will improve the learning effectiveness of students [3].

Corresponding author: nureize@uthm.edu.my

Currently, teacher of Malay language teaches students according to the syllabus provided by the ministry. Also, other teaching aid like textbooks is used at the school as learning Malay is difficult [4]. Additionally, students are expose to the online teaching aid such as Google Classroom, Edmodo, Kahoot and more. Each of these learning platforms is separate. Therefore, the findings from the use of these teaching aids cannot be easily combined for teachers to see the development of student learning as a whole. While, teachers need to use a variety of resources that require a long time to master and examine the learning content before giving it to students. This causes teachers to allocate more time for this process compared to the learning process with the students themselves.

Additionally, for such current implement of teaching method, teacher do not have enough time to teach and measure student performance within class period. Although test and examination will be conducted periodically, it may not be enough. The results of tests and examinations will help teachers identify students' weaknesses and provide training to teachers to help students improve their learning. Another problem is the content of the teaching aids available in the Internet may not exactly follow the syllabus provided by Ministry of Education. While there are many online quiz applications and software available on the various platforms mentioned above, none of them specialize in one course or one subject that must be focused on by the teacher or student. Some of them offer the ability to create their own questions and answers, but this requires a lot of time and effort from the teacher.

Hence, a centralized system based on the e-learning concept has been developed to overcome the limitation of the existing learning and teaching process. As a case study, the developed project will utilize the Malay Language Year 1 of primary school. The system will contain a variety of teaching material, which include notes in the form of text, picture and videos, assessment like test, quiz and exercise. The multiple-choice quiz will be designed correlate with subject teacher of Malay Year 1 in primary school. With the score system of the developed system, teacher can measure the student performance on topic that had been taught by viewing the result of the quiz. Consequently, this system can serve as a way for teachers to teach Malay. Since this system will also contain a scoring system, this will allow the teacher to know the students' understanding of the Malay language, whether students understand what is taught during class or not. If students get low scores, which means students may not understand what is being taught, teachers can then take action to help those students improve their Malay. The developed system can address the problem as the content of the quiz is designed according to the syllabus. By playing the quiz and reading through the teaching material, the student will also learn the same knowledge as they would learn from school teaching.

This article is organized into six sections. The first section describes the context of the project. The second section explains the analysis of literature. In the third part, the methodology is explained. The analysis and design of the system is described in the fourth section. Section 5 describes the implementation and testing of the system. While the conclusion is given in the last section.

2. Related Work

By studying the current learning process of Standard 1 Malay subject, the problem with current learning process had been identified. The problems identified from the case study were used as a guide for the development of this project. This is to ensure that the developed system can meet its objectives as a method to solve the problem. E-learning methods have been chosen for use in the development of new systems. E-learning, which can be defined as online learning and teaching through Internet technology, is one of the important developments in the growing educational needs [5]. E-learning is different from traditional teaching, can be delivered through a variety of different forms, such as live broadcasts, pre-recorded lecture content such as video or voice recordings, quizzes, computer simulations, games and other interactive elements. E-Learning can also be synchronous and asynchronous [6]. Because E-learning can be delivered in many ways, its content can also have various forms such as performance support content and more.

E-Learning system is an educational platform or online system which E-Learning take place. E-Learning system provides features like sharing of teaching material in various format, forum for discussion between teachers and students that will reduce the workload of educators. Some E-Learning system also provide assessment function like online quiz and online test so teachers can use all the class period on teaching. Some example of E-Learning system is discussion form, learning management system (LMS), large-scale open online course (MOOC) [7] and so on.

The findings of the research can be used to develop the proposed system of the same concept by conducting a study on the principles and characteristics of the E-Learning system. This is to ensure that the new system will comply with the basic specifications of the e-learning system and that the current initial issues can be further resolved. Three existing e-learning based systems have been examined to obtain more useful information for the proposed system development. The systems studied were Kahoot, Quizizz, and Edmodo. Main features including modules are compared and results are listed in Table 1.

Table 1: Comparison with Existing System

Module	Kahoot	Quizizz	Edmodo	E-Learning System for Year 1 Malay Subject
System Type	Web-based Android iOS	Web-based Android iOS	Web-based Android iOS	Web-based
Login Module	Available	Available	Available	Available
Quiz Module	Available	Available	Available	Available
Teaching Material Module	Not available	Not available	Available	Available
Score and Assessment Module	Available	Available	Not available	Available
Report Module	Available	Available	Available	Available
Data Management Module	Available	Available	Available	Available
Programming Language	Unknown	Unknown	Unknown	PHP, JavaScript, JQuery, mySQL

3. Methodology

For this project, Prototyping model is chosen. This model was chosen because end users will participate in the expansion. This means that their opinion after trying the system prototype will be considered into the next series of prototypes to help improve system functionality. The prototype model contains the planning phase, then the analysis phase, the design phase, the implementation phase simultaneously which produces the system prototype until the complete system is produced. As shown in Table 2, each phase has its own assignment and output that need to produce during the entire project development.

Table 2: Software development task

Phase	Task	Output
Planning	Proposed the project	Project proposal
	Determine the project schedule, activities and output	Develop Gantt chart
	Information gathering	
Analysis	Analysis of data collected	Hardware requirement
	Identify hardware and software requirements	Software requirement
	Produce Data Flow Diagram (DFD) and Entity Relationship Diagram (ERD)	Data Flow Diagram (DFD) Entity Relationship Diagram (ERD)
Design	Produce database design, system design, interface design	Flowchart Database design (schema and data dictionary) User interface design
Implementation	Start system programming	Prototype 1
	Produce system prototype 1	Prototype 2
	Obtain the end users' opinion after trying out the system	Completed system
	Modify system according to the opinion obtained	
	System prototype 2	
Testing	System functionality testing for bugs or errors	Fully functional system

3.1 Planning Phase

In planning phase, the information gather is carried out to outline the project schedule, activities and its output. Interview with subject expert is also carrying out to produce various requirements in analysis phase.

3.2 Analysis Phase

The result of analysis phase is shown is several table and figure. First is functional and non-functional requirements. Requirement analysis is the process of determine requirements that developed system needs to fulfill, or user expectation outcome from the proposed system. System requirements include functional and non-functional requirements, user requirements and system requirements. Table 3 and Table 4 show functional and non-functional requirement, respectively.

Table 3: Functional requirements

No	Module	Description
1.	Login Module	• The system should allow user to login into the system using registered id and password. • The system should only allow a user to log in as a user with a valid ID and password. • The system should alert the user for any invalid input. • The system should redirect user to that respective main menu upon successful login.

No	Module	Description

Table 3: Functional requirements (cont.)

2.	Quiz Module	• The system should allow student to select quiz that are available to them • The system should allow students to play all available quizzes for them. • The system should allow students to re-play all previous played quiz • The system should display the quiz result to students after the quiz end
3.	Teaching material module	• The system should allow students to access the teaching materials uploaded. • The system should allow students to view teaching material available to them
4.	Score and assessment module	• The system should record the score of any quiz played. • The system should allow teachers to view the results of their students' quizzes played. • The system should perform analysis and evaluation on each outcome of the quiz played.
5.	Data management module	• The system should allow teacher to view the question and answer for the question of all quiz. • The system should allow teachers to change and delete quiz questions and answers. • The system should allow teachers to create new quizzes and delete existing quizzes. • The system should allow teachers to change the availability of quiz to students. • The system should allow teachers to view and edit their teachers profile. • The system should allow teachers to view and edit the profiles of each students. • The system should allow teachers to upload teaching material in various format like pdf, video, slide presentation to the system. • The system should allow administrator to create new class and delete existing class. • The system should allow administrator to register new student, teacher and administrator. • The system should allow administrator to enroll students into existing class and remove students from their enrolled class. • The system should allow administrator to view and edit the profiles of each students. • The system should allow administrator to view and edit the profiles of each teachers. • The system should allow administrator to view and edit the profiles of each administrators.
6.	Report module	• The system should generate report for teacher to view. • The system should generate error message if the report can't be generated.

Table 4: Non-functional requirements of the developed system

No	Requirements	Description
1.	Performance	• The system should be usable at all times
2.	Operational	• The loading time required for a website is no more than 1 minute
3.	Security	• The system should be user friendly
4.	Cultural and political	• The system should be able to work on any web browser

Level 0 Data Flow Diagram (DFD 0) of the developed system is shown at Figure 1. It contains six main processes. Students, teachers and administrators will need to provide a valid id and password to enter the system. The second process is to play a quiz. This process is exclusive to students. Students play a quiz and give answers to each quiz question. Once the quiz is completed, the system will display the quiz results to the students. The system will then save the quiz results. The third process is teaching materials. This process is for students only. Students can ask to see the teaching materials they have.

The fourth process is assessment. Teachers will ask to see student profiles, their quiz results and assessment based on quiz results. Then, the evaluation results are saved. The fifth process is data management. This is for teachers and administrators. Teachers can create new quizzes, delete existing quizzes and change existing quiz questions and answers. Administrators can create new classes, delete existing classes, register or remove students from existing classes. The sixth process is to generate a report. This process is for teachers only. Teachers can ask the system to generate a report according to the teacher's query that can be compared between two or more quiz results and overall performance.

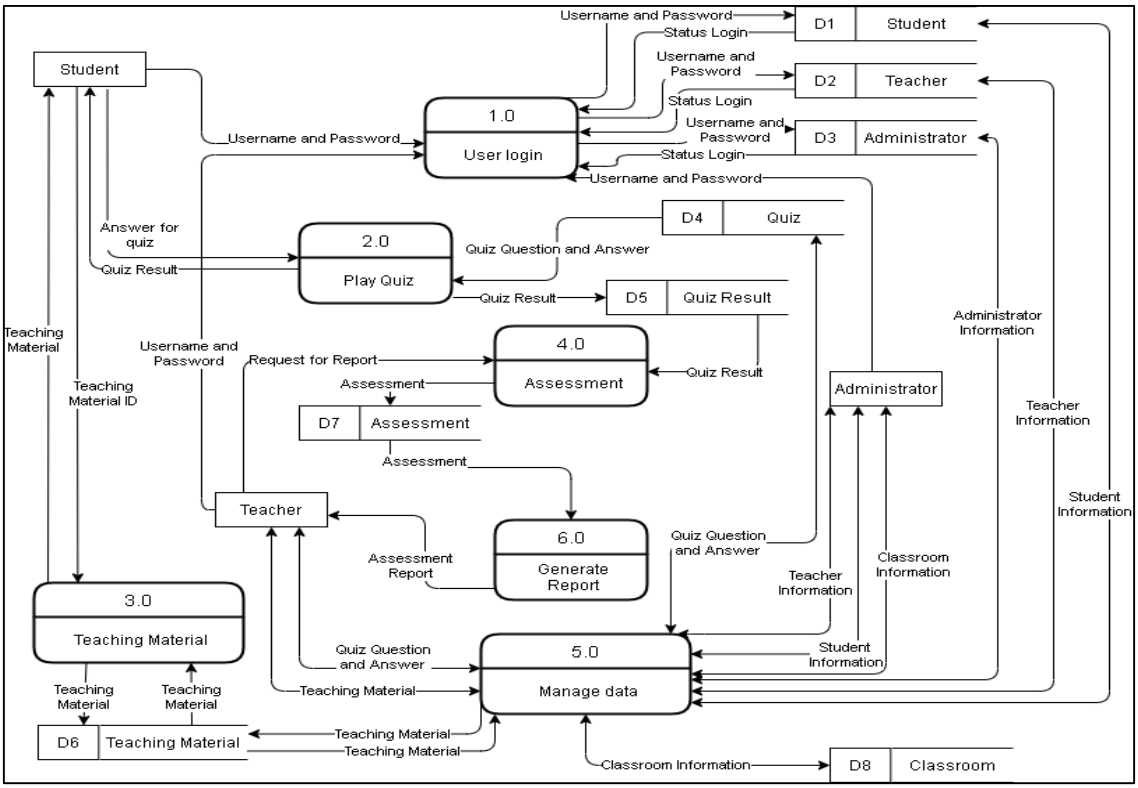

Figure 1: Data Flow Diagram level 0

Third is Entity Relationship Diagram (ERD) of the system which is shown at figure 2. It contains 9 entities which are student, teacher, administrator, teaching material, classroom, quiz, quiz result, quiz group and assessment. Table student stores all information of student. Table teacher stores all information of teacher. Table administrator store all information of administrator. Table teaching material stores all information of uploaded teaching material. Table classroom stores all information of classroom. Table quiz stores information of each quiz question and its answer. Table quiz group stores information of quiz group that have 10 quiz questions related to a single topic. Table quiz result stores information of quiz result of each played quiz by each student. Table assessment stores results of evaluation and analysis performed on the results of quiz.

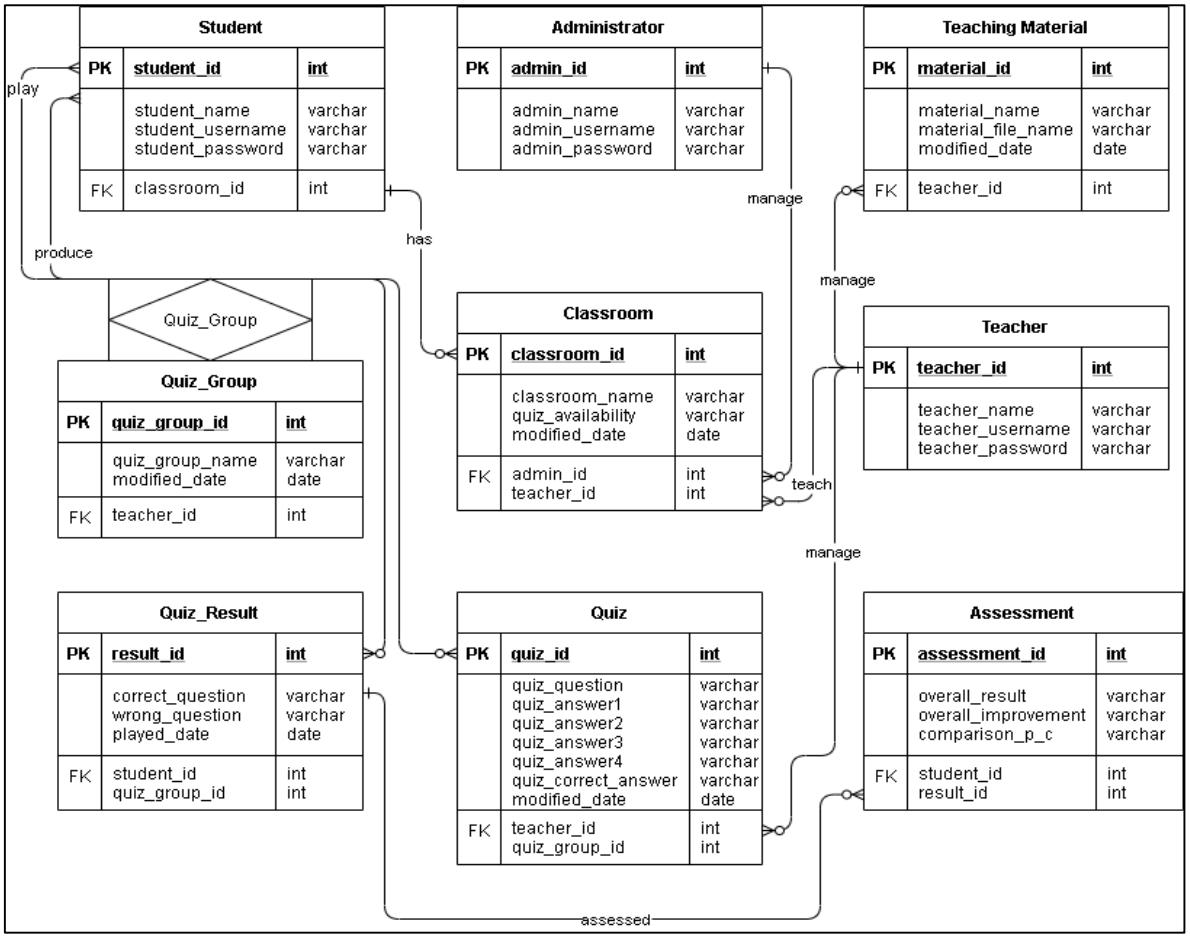

Figure 2: Entity Relationship Diagram

Schema for the database is listed in the following.

i. Student (student_id, student_name, student_username, student_password, classroom_id)
ii. Teacher (teacher_id, teacher_name, teacher_username, teacher_password)
iii. Administrator (admin_id, admin_name, admin_username, admin_password)
iv. Teaching Material (material_id, material_name,material_file_name, modified_date, teacher_id)
v. Quiz (quiz_id, quiz_question1, quiz_question2, quiz_question3, quiz_question4, quiz_correct_answer, modified_date, teacher_id, quiz_group_id)
vi. Quiz Group (quiz_group_id, quiz_group_name, modified_date, teacher_id)
vii. Quiz Result (result_id, correct_question, wrong_question, played_date, student_id, quiz_group_id)
viii. Classroom (classroom_id, classroom_name, quiz_availability, modified_date, admin_id, teacher_id)
ix. Assessment (assessment_id, overall_result, overall_improvement, comparison_p_c, student_id, result_id)

3.3 Design Phase

Figure 3 shows the system flowchart for students. Students have three choices which are view teaching material, check previous quiz result and play quiz. Student can view teaching material by select teaching material after which system will display it. Student can view quiz result by select previous result after then system will display it. Student can play a quiz by select quiz. After then, system will create quiz. After answering 10 questions, quiz result is generated and display to student.

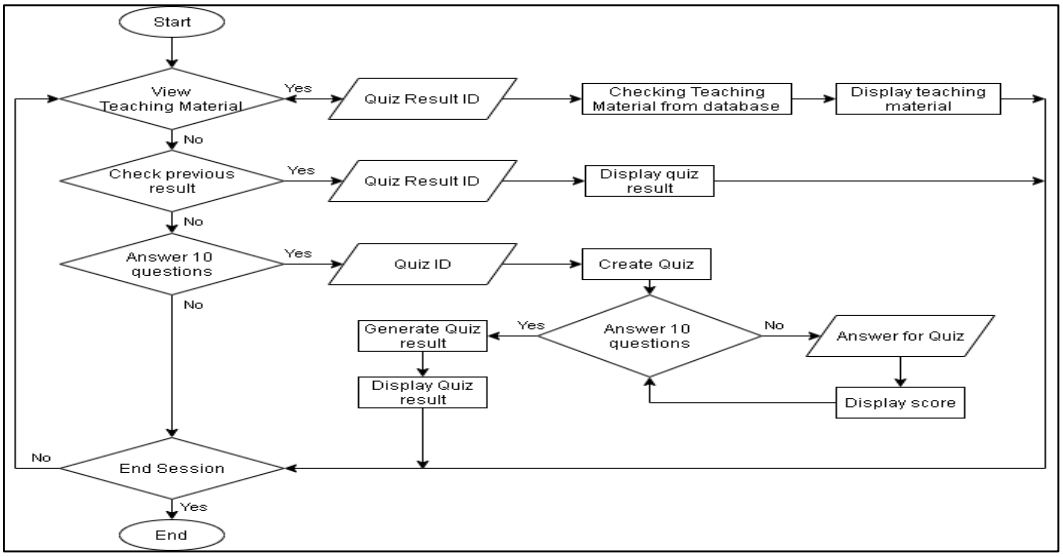

Figure 3: Student Flowchart

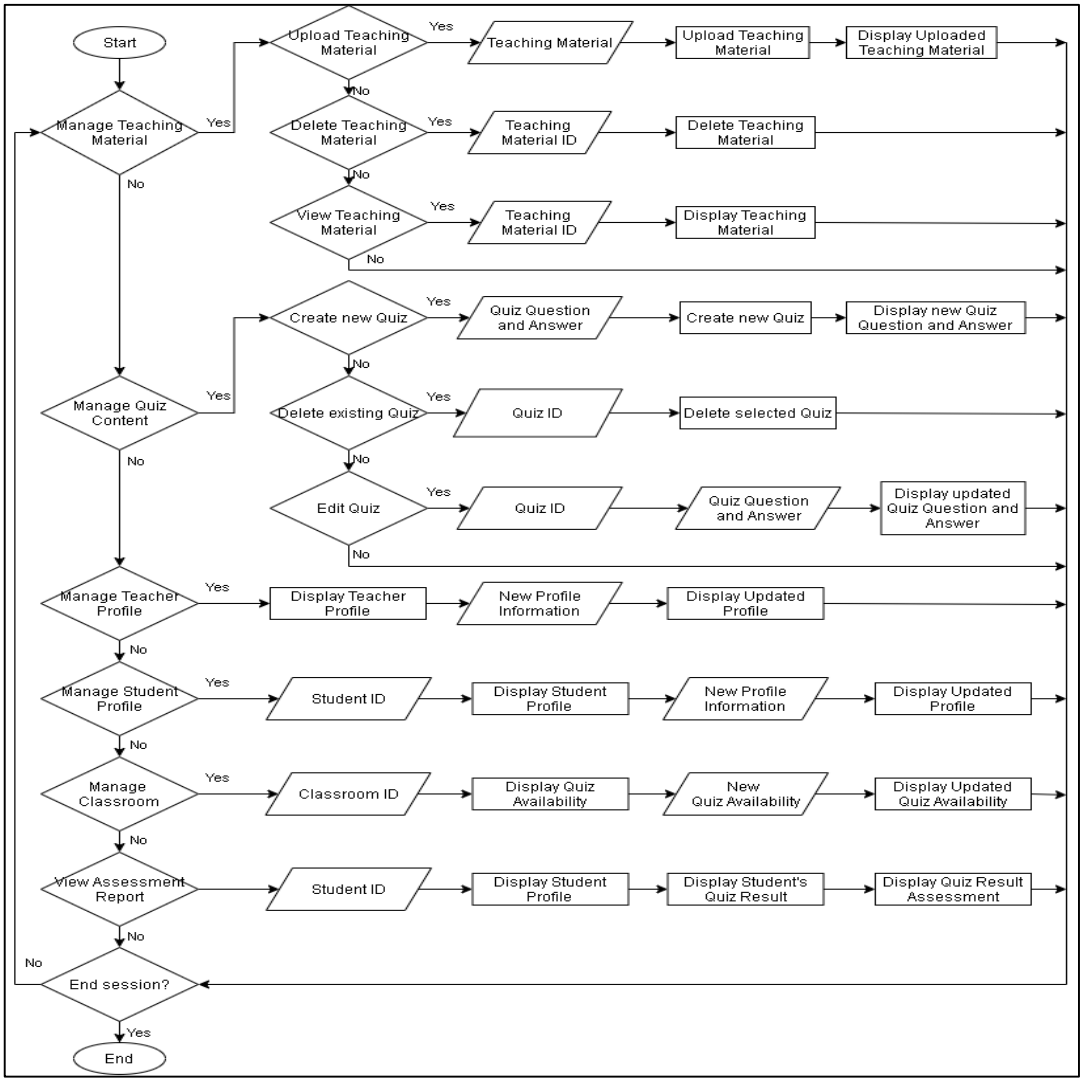

Figure 4: Teacher Flowchart

Figure 4 shows the system flowchart for teachers. Teacher have 6 choices which are manage teaching material, manage quiz content, manage teacher profile, manage student profile, manage classroom and view assessment report. Teacher can manage teaching material by either upload new teaching material, delete existing teaching material and view existing teaching material. Teacher can manage quiz content by either create new quiz, delete existing quiz, or edit existing quiz. Teacher can manage his or her own profile by inputting new information. Teacher can manage student profile by inputting new information. Teacher can manage classroom by changing quiz availability of his or her assigned classroom. Teacher can view assessment report of his or her own students.

3.4 Implementation Phase

The software used for the development of this system is Adobe Dreamweaver and Xampp Control Panel. Adobe Dreamweaver is used to develop interfaces for front end and back end processes. The programming languages used to develop the front-end are HTML, JavaScript and jQuery while the back end is PHP. The Xampp control panel is used to develop a database for a system using the SQL programming language.

Login module allows student, teacher, administrator to login into the system. The user needs to enter the correct username and password and choose the correct position. If the username and password entered contain non-alphanumeric characters, the system will show an error, as shown in Figure 5. If the username and password are found in database, user will be redirect to their respective homepage.

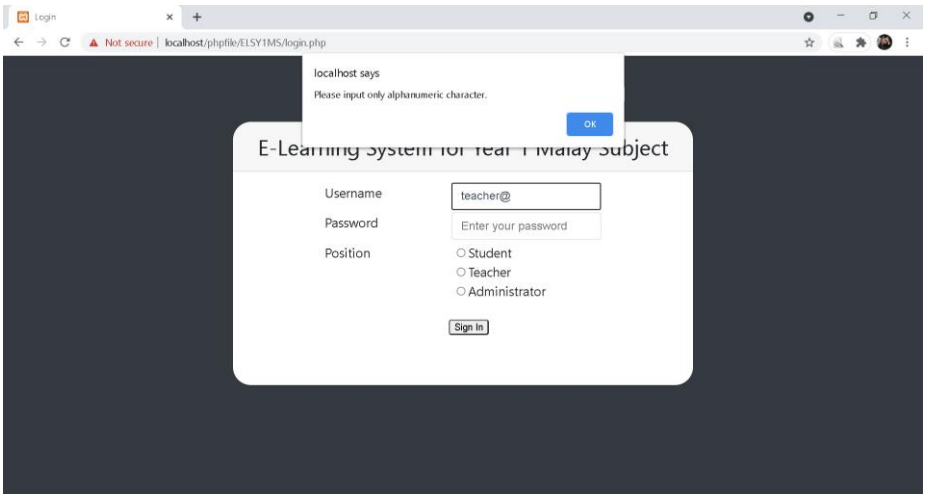

Figure 5: Login Interface

Quiz module allow student to select and play quiz available to students. Figure 6 shows the interface for play quiz. After student click on the quiz group name, this interface will be displayed. At the top of the center part is the name of the quiz group. At the top left show which question student is currently answering and top right show the current score of this quiz student had attained. At the center is quiz question and four quiz answer located at the upper part and lower part respectively. Student needs to select one answer to continue to next question. After 10 question is answered, system will record the score and perform assessment on the score. After that, system will display a pop-up message saying student had completed the quiz and redirect the student back to quiz list.

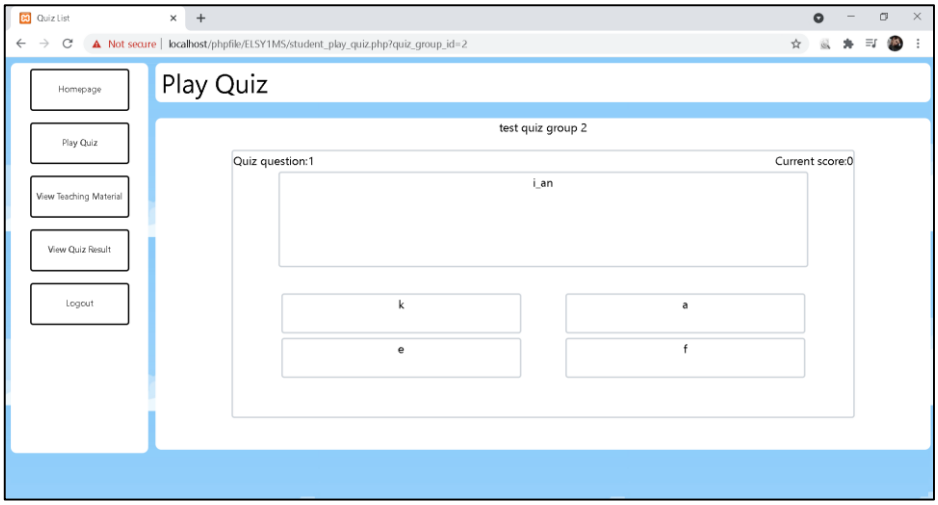

Figure 6: Play Quiz Interface

Teaching material module will display teaching material for student to view. This module also allow teacher to upload new teaching material to the system and delete existed teaching material. To view teaching material, students and teachers needs to click on the name of teaching material, which system will display the teaching material at a new browser tab. To upload new teaching material, teacher needs to input the name of teaching material, select the teaching material for upload, then click the upload button. To delete existed teaching material, teacher needs to click the delete beside the teaching material teacher wish to delete. Figure 7 shows the interface of teaching material list. Data management module allow teachers manage student profile, their own teacher profile, classroom and administrators to manage student profile, teacher profile, administrator profile and classroom.

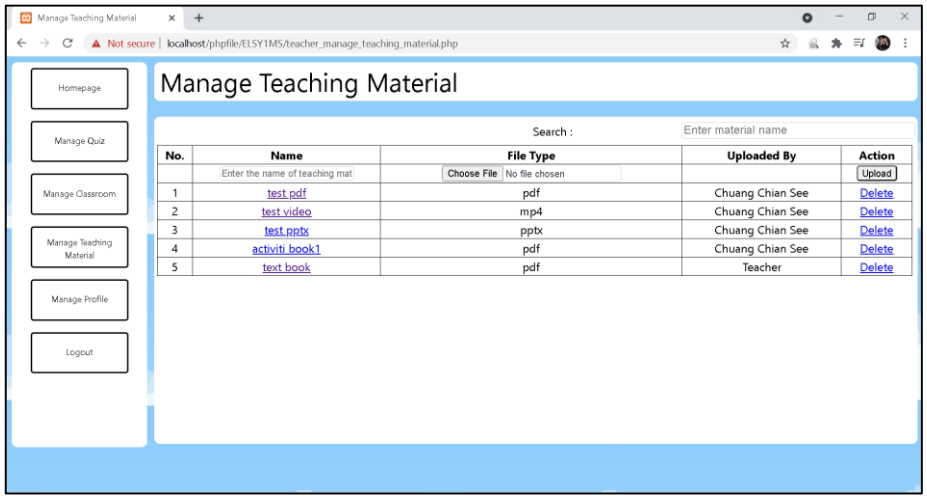

Figure 7: Teaching Material List Interface

Figure 8 shows the interface for manage administrator profile. Administrator can create new administrator profile by inputting all necessary information and click create button. Administrators can also update existing administrator profiles by clicking on the administrator name, which system will display the selected administrator profile information. After inputting all new information, administrator needs to click update button to complete the process.

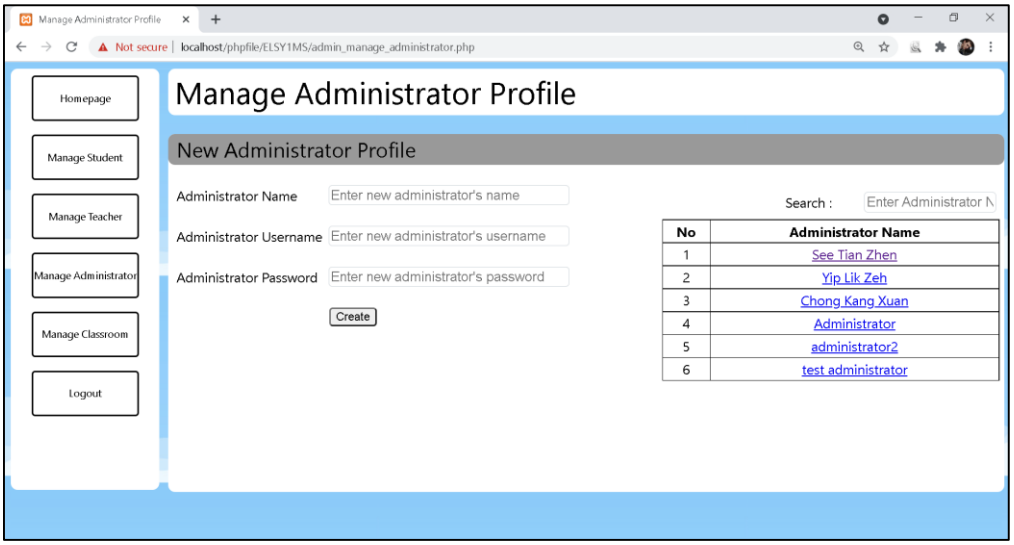

Figure 8: Manage Administrator Profile Interface

Figure 9 shows the interface for manage student profile for teacher. Teacher can view student information and their assessment here. Teacher can also view the detail of each quiz result by clicking the name of quiz group. Teacher can also update the student profile with this interface. Teachers are only allowed to update student name. After inputting new student name, teacher needs to click the update button.

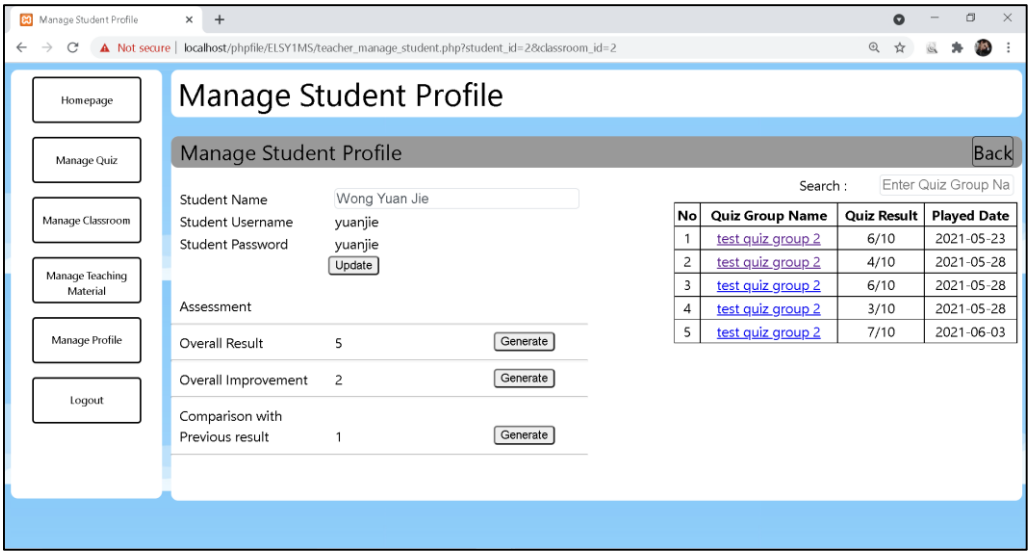

Figure 9: Manage Student Profile Interface

Generate report module generate report on details of each quiz result and assessment on past 10 quiz result of each student in line chart for teacher to view. Figure 10 shows the interface of view quiz result.

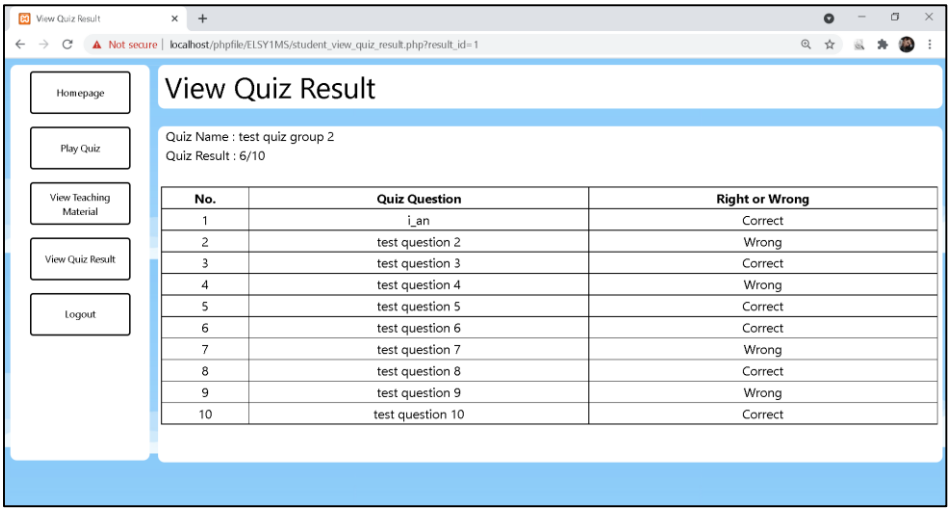

Figure 10: View Quiz Result Interface

4. Result and Discussion

Testing is carried out to test the functionality of all six modules. Table 5 shows the test case for login module. Table 6 shows the test case for teaching material module. Table 7 shows the test case for generate report module.

Table 5: Test Case for Login Module

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M1-1	To check whether the student, teacher and administrator can login into the system	The student, teacher and administrator should be able to login into the system.	The student, teacher and administrator can successfully login into system.	Pass
M1-2	To check whether system will alert student, teacher and administrator about potential wrong username or password.	The system should alert student, teacher and administrator about wrong username and password	The system can alert student, teacher and administrator about wrong username and password.	Pass
M1-3	To check whether the system will alert student, teacher and administrator if they input invalid username and password	The student, teacher and administrator should input new username and password.	The student, teacher and administrator need to input new username and password	Pass
M1-4	To check whether system will redirect student, teacher and administrator to their respective homepage.	The system should redirect student, teacher and administrator to their respective homepage.	The system can redirect student, teacher and administrator to their respective homepage.	Pass

Table 6: Test Case for Teaching Material Module

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M3-1	To check whether the system allow students to access the uploaded teaching material	The student should be able to access and the uploaded teaching material.	The student can access the uploaded teaching material.	Pass
M3-2	To check whether the system allow students to view the uploaded teaching material	The student should be able to view the uploaded teaching material.	The student can view the uploaded teaching material.	Pass

Table 7: Test Case for Generate Report Module

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M6-1	To check whether the system will generate report for teacher to view.	The system should be able to generate report for teacher to view.	The system can generate report for teacher to view.	Pass
M6-2	To check whether the system will allow teacher to view details of each quiz results.	The teacher should be able to view details of each quiz results.	The teacher can view details of each quiz results.	Pass

Table 8 shows the test case for quiz module. Table 9 shows the test case for score and assessment module. Table 10 shows the test case for data management module.

Table 8: Test Case for Quiz Module

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M2-1	To check whether the student can select and play quizzes that are available to them	The student should be able to select and play quizzes that are available to them.	The student can select and play quizzes that are available to them.	Pass
M2-2	To check whether the system allow student to re-play all previous played quizzes.	The student should be able to re-play all previous played quizzes.	The student can re-play all previous played quizzes.	Pass
M2-3	To check whether system will display quiz result after the quiz ends	The system should be able to display the quiz result after the quiz ends.	The system can display quiz results after the quiz ends.	Pass

Table 9: Test Case for Score and Assessment Module

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M4-1	To check whether the system will record the result of any quiz played.	The system should be able to record the result of any quiz played.	The system can record the result of any quiz played.	Pass
M4-2	To check whether the system will perform assessment on each quiz results.	The system should be able to perform assessment on each quiz results.	The system can perform assessment on each quiz results.	Pass

Table 10: Test Case for Data Management Module

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M5-1	To check whether the system will allow teacher to view and modify all quiz question and answer.	The teacher should be able to view and modify all quiz question and answer.	The teacher can view and modify all quiz question and answer.	Pass
M5-2	To check whether the system will allow teacher to create new quiz group and delete existed quiz group.	The teacher should be able to create new quiz group and delete existed quiz group.	The teacher can create new quiz group and delete existed quiz group.	Pass
M5-3	To check whether the system will allow teacher to change the quiz availability for each assigned class.	The teacher should be able to change the quiz availability for each assigned class.	The teacher can change the quiz availability for each assigned class.	Pass
M5-4	To check whether the system will allow teacher to view and change their teacher profile.	The teacher should be able to view and change their teacher profile.	The teacher can view and change their teacher profile.	Pass
M5-5	To check whether the system will allow teacher to view and change the student profile.	The teacher should be able to view and change the student profile.	The teacher can view and change the student profile.	Pass
M5-6	To check whether the system allow teacher to view and upload teaching material.	The teacher should be able to view and upload teaching material.	The teacher can view and upload teaching material.	Pass

Table 8: Test Case for Data Management Module (cont'd)

Test Case ID	Description	Expected Result	Actual	Pass/Fail
M5-7	To check whether the system will allow administrator to create new class and delete existed class.	The administrator should be able to create new class and delete existed class.	The administrator can create new class and delete existed class.	Pass
M5-8	To check whether the system will allow administrator to register new student, teacher and administrator.	The administrator should be able to register new student, teacher and administrator.	The administrator can register new student, teacher and administrator.	Pass
M5-9	To check whether the system will allow administrator to enroll student into class and remove student from class.	The administrator should be able to enroll student into class and remove student from class.	The administrator can enroll student into class and remove student from class.	Pass
M5-10	To check whether the system will allow administrator to view and modify student profile.	The administrator should be able to view and modify student profile.	The administrator can view and modify student profile.	Pass
M5-11	To check whether the system will allow administrator to view and modify teacher profile.	The administrator should be able to view and modify teacher profile.	The administrator can view and modify teacher profile.	Pass
M5-12	To check whether the system will allow administrator to view and modify administrator profile.	The administrator should be able to view and modify administrator profile.	The administrator can view and modify administrator profile.	Pass

5. Conclusion

E-Learning System for Year 1 Malay Subject is developed as an alternative way of learning Malay subject for Year 1 student and to ease the workload of teacher by automatically marking all quiz and provide assessment based on the quiz result. By viewing the assessments, teacher can quickly understand which student needs help and on what area of Malay for example grammar and so on. The uploaded teaching material will also serve as revision for students before playing the quiz.

Acknowledgement

The authors would like to thank the Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia for its support.

References

[1] I. N. Mohd Shaharanee, J. Hamil, and S.S. Mohamad Rodzi, S. S. "The application of Google Classroom as a tool for teaching and learning, " Journal of Telecommunication, Electronic and Computer Engineering, vol. 8, no.10, pp. 5-8, 2016.

[2] R. Dellos, R. "Kahoot! A digital game resource for learning," International Journal of Instructional technology and distance learning, vol. 12, no. 4, pp. 49-52, 2015.

[3] C. H., Cheng, and C. H. Su, A Game-based learning system for improving student's learning effectiveness in system analysis course. Procedia-Social and Behavioral Sciences, vol. 31, pp. 669-675, 2012

[4] N. S. B. S. Kamal, Z. Abdullah, and M. F. B. A. Ghani, The Challenges of School Administrators in Teaching and Learning Process for Malay Literacy Subject in Primary School. In 3rd International Conference on Research of Educational Administration and Management (ICREAM 2019) (pp. 372-380). Atlantis Press, 2020, February.

[5] D., Zhang, J. L., Zhao, and J, F. Nunamaker Jrm. "Can e-learning replace classroom learning?," Communication of the ACM, vol. 47, no. 5, pp. 75-79, 2004.

[6] F.P. Lim, "An analysis of synchronous and asynchronous communication tools in e-learning," Advanced Science and Technology Letters, vol. 143, no. 46, pp. 230-234.

[7] A. M., Kaplan, and M. Haenlein, "Higher education and the digital revolution: About MOOCs, SPOCs, social media, and the Cookie Monster". Business Horizons, 59(4), 441-45, 2016.