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Web-Based Students Assessment System for Efficient Assessment

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Abstract: Assessment is carried out to know the achievement of learning outcomes. The use of Microsoft Excel to replace the School Exam Analysis system (SAPS) during the Covid-19 pandemic resulted in the inefficiency of recording, analyzing, and display of students' assessment data. Therefore, this study proposes an online assessment system for efficient management of students' assessment data. The system was created based on the Waterfall model using JavaScript, PHP, HTML, CSS, and SCSS as the programming languages, and MySQL as the database. Testing found that the majority of respondents believed that the system aids school administration, teachers, and students. Future work will improve the dashboard for each type of user.

Keywords: Appraisal System, Web-Based System, Assessment, PHP, CSS

1. Introduction

Assessment is a technique for recording the learner's knowledge, abilities, attitudes, and beliefs in quantifiable terms [1]. Assessment is vital in the learning process to provide feedback to the teacher whether the learning objectives for the course have been achieved. Assessment allows students to know their level of mastery in learning, self-diagnosing, and monitoring, to stimulate learning enthusiasm [2]. Teachers may enhance teaching and learning in the classroom by classifying and grading their students, providing feedback, and structuring their plans accordingly through effective assessments such as tests, quizzes, assignments, projects, presentations, and exams.

In Malaysia, when the primary school grading method switched from School Assessment to Classroom Assessment (PBD) in 2018 [3], Microsoft Excel spreadsheets provided by the Ministry of Education (MoE) [4] replaced the School Exam Analysis system (SAPS) because it did not support the

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PBD. Hence, teachers manually input and process students' exam marks in a spreadsheet that contain student list entered by the school staff during registration.

Problems encountered include; 1) incorrect data entry and processing [5], 2) time-consuming, 3) file may get corrupted, infected by a virus [6], have compatibility issue as different teachers might use different versions of Microsoft Excel, and there are multiple files for a class storing data for different subjects, and 4) data security issue as authentication is not set up by default, thus a possibility of data modification by unknown third parties. This manual process is inefficient, and may cause problems in the future.

Hence, this study proposes a web-based assessment system for school administrators, teachers, students, and parents. Admin manages 1) student info which are name, gender, identification card (IC) number, and current class, 2) teacher info which are name, IC number, email, current subjects taught, class that they are the class teacher for (if they are a class teacher), and 3) class info which are class name, list of students, and current year. Teachers enter students' marks and update class info. System determines and displays the grade of subjects. Parents or students can view results. Web-based provides portability [7] as the application can be accessed through the internet using PC, mobile computer, or mobile device. The front end of the system is a browser used by users to input data and access content, whereas the back end saves users' information in a database. A prototype of the system was developed for Kota Raja primary school.

2. Materials and Methods

The Waterfall model was chosen as the system's development life cycle as shown in **Figure 1**. This model is a strict phase-based linear application development model and the outcome of one phase acts as the input for the next phase [8]. Each phase has specific activities and goals and must be completed to begin the next phase without overlap between phases. Each phase is clearly described and documented for development quality. There are six phases; requirement, design, development, testing, deployment, and maintenance.

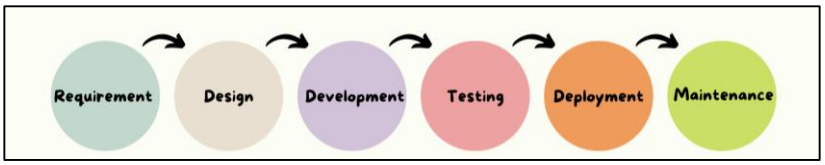

Figure 1: Waterfall model

In the requirements phase, 10 teachers from Kota Raja primary school were asked about SAPS to identify problems with it, and to determine the requirements of the proposed system. Five were interviewed face to face and another five responded online through Google Forms as they were unable to attend. Six of them were currently classroom teachers while four had been classroom teachers. **Table 1** summarizes the result of the analysis.

Table 1: Views regarding SAPS

Question	Yes (%)	No (%)
Does data loss happen when you use the system?	80	20
Is it difficult to record data using the system?	60	40
Does data duplication happen in the system?	80	20
Are you pleased with the system?	80	20

Does the system's interface needs to be upgraded?	100	0

20% of participants experienced data loss while using SAPS. 40% of respondents have difficulty recording data using SAPS, may be because the system lacks user friendliness or the teachers lack computer literacy. 80% of respondents experience data duplication while using SAPS. 20% of respondents were dissatisfied with SAPS as it did not support the latest marking schemes, according to the Secretary of Internal Examination of the school. All respondents agreed that SAPS' interface needs to be upgraded. They suggested the proposed system to be "user-friendly", "simpler and easier to access", and linked with a "good server".

In the design phase, mock-ups of the system interface, data flow diagram (DFD), and entity relationship diagram (ERD) were drawn. An admin manages many teachers and students. A teacher teaches many classes and subjects and a class or a subject taught by many teachers. A student belongs to many classes, and a class comprises many students. A student learns many subjects, and a subject learnt by many students.

In the development phase, the system was constructed using JavaScript, PHP, HTML, CSS, and SCSS as the programming languages, MySQL as the database, and XAMPP as the integrated development environment (IDE). The login page requires users to insert their IC number (parents access using their child's IC number) as username and their password. Students will be given a default password that they are required to change once they logged in.

The system admin can access five pages; Dashboard, Teachers, Students, Scoring, and Profile. The dashboard page displays a pie chart of the performance of all students in the school by grade and the number of teachers, students, and administrators registered in the system. The teachers' page enables the admin to add a new teacher (**Figure 2**) and view and print the list of teachers. The students' page enables the admin to view the list of students by class, view exam slips and edit students' data. The scoring page enables the admin to view marks of students.

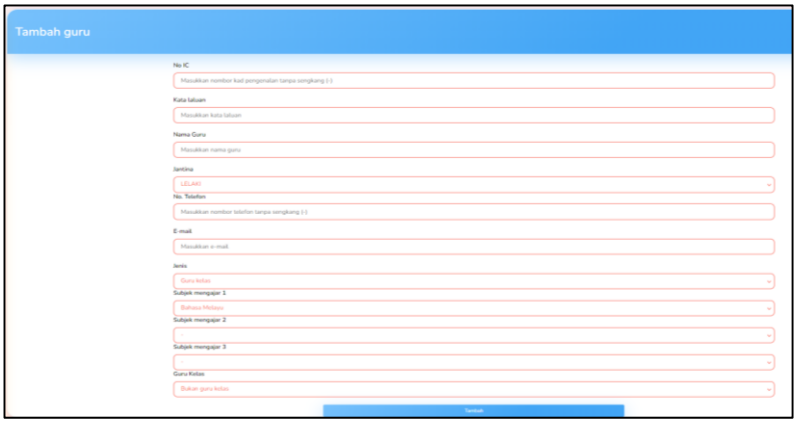

Figure 2: Add teacher

Teachers can access four pages; Dashboard, Students, Scoring, and Profile. Teachers can insert and edit marks (**Figure 3**).

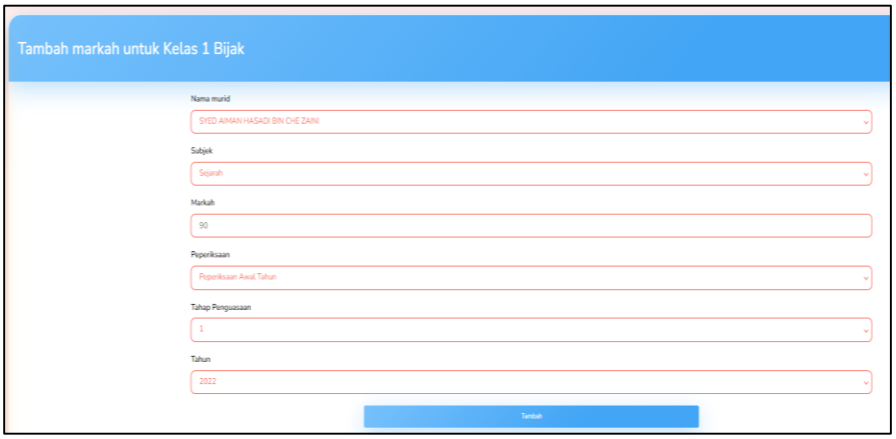

Figure 3: Insert mark

Students and parents can access two pages; Dashboard and Results. The results page (**Figure 4**) displays students' current examination slip.

SEKOLAH KEBANGSAAN KOTA RAJA

SLIP KEPUTUSAN - Peperiksaan Awal Tahun -

Nama	: SYED AIMAN HASADI BIN CHE ZAINI	Kelas	: 1 Bijak
No. KP	: 050230503423	Jantina	: Lelaki

Bil	Mata Pelajaran	Markah	Gred
1.	BAHASA MELAYU	75	A
2.	BAHASA INGGERIS	81	A
3.	MATEMATIK	100	A
4.	PENDIDIKAN ISLAM		TH
5.	PENDIDIKAN SENI VISUAL		TH
6.	BAHASA ARAB		TH
7.	TASMIK		TH
8.	SAINS	85	A

Bilangan Mata Pelajaran Daftar	: 8	Jumlah Markah	: 341
Kedudukan Dalam Kelas	: 1 / 2		
Kedudukan Dalam Darjah	: 1 / -	Peratus	: 42.625
Kehadiran	: 100 / - Hari	Gred Purata Pelajar	: 0.5
Pencapaian Gred Keseluruhan	: 4[A] 0[B] 4[TH]	Keputusan	: LULUS

Nama Guru Kelas : ADAM MIRZAN BIN AHMAD RIDZUAN

Ulasan Guru Kelas : BAIK

Figure 4: Exam slip

In the testing phase, 10 teachers tested the system using the developer's laptop. Five of them then evaluated the system through a paper survey and others through an online survey using Google Forms due to lack of paper survey and time. The link to the online survey was given via WhatsApp. The survey comprises fourteen four-point Likert scale questions ranging from strongly disagree to strongly agree.

In the deployment phase, the system will be installed in the school server for use. In the maintenance phase, the system may be updated to eliminate bugs and to update features.

3. Results and Discussion

Table 2 summarizes the survey's results. Respondents were satisfied with the system's security because it has a login page. Respondents agreed that the system prevents them from making mistakes during mark insertion because it has input validations. Respondents strongly agreed that the system enables fast mark insertion because students' information is already there instead of the teachers having to enter them in Excel. Overall, respondents were satisfied with the system as they perceived the system as less complicated than SAPS.

Table 2: Survey results

Question	Strongly Disagree	Disagree	Agree	Strongly Agree
I am satisfied with the security of this system.	0	0	3	7
This system prevents teachers from making mistakes during mark insertion.	0	0	4	6
This system helps teachers insert marks in a short period.	0	0	0	10
Overall, I am satisfied with this system.	0	0	0	10

4. Conclusion

Assessment provides feedback to teachers and students regarding the achievement of learning outcomes. Use of Excel files to store and process assessment marks is inefficient. Thus, a web-based assessment system was developed for efficient management of assessment marks. Testers were satisfied with the system. Future work includes improving dashboards to display meaningful data depending on user type, and enable storage and retrieval of data across years.

Acknowledgment

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