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A Web-Based System for Managing Student Attendance and Assessment Submissions: An SDLC Waterfall Model Approach

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ABSTRACT

University lecturers handle numerous tasks, including tracking student attendance, managing multiple assessment submissions, handling online tests and quizzes, as well as providing timely evaluations of assessments. Currently, these processes are manually managed, which can be time-consuming and inefficient due to the absence of an integrated web-based application system. For example, students often submit their assignments or project papers through cloud storage links provided by lecturers. However, the lack of standardization in file naming frequently forces lecturers to spend additional time renaming hundreds of files before they can begin the grading process. This paper presents a proposed solution in the form of an integrated web-based application system designed to automate and streamline critical tasks like attendance tracking, assignment submission, and evaluation, serving as a comprehensive, one-stop solution for lecturers. SDLC (System Development Life Cycle) Waterfall Development Approach was applied as a method of system construction. HTML and PHP were employed for its implementation and handling of diverse functionalities. To assess the system's effectiveness, it was tested over one academic semester with the participation of 111 degree and diploma students at Universiti Teknologi MARA, Perlis branch. Findings revealed that the system significantly simplified the attendance logging process and streamlined assignment submissions, as perceived by the students. In parallel, lecturers reported that the system facilitated a more efficient grading process, allowing them to return assessments promptly and allowing students to access their marks quickly and easily. Overall, the integration of these automated modules helped reduce bureaucratic inefficiencies, allowing lecturers to perform their duties with greater efficiency and less stress. Positive feedback from students also highlighted a desire for this system to be expanded to other courses, alongside suggestions for further enhancements to improve functionality.

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1. INTRODUCTION

Lecturers have multifaceted responsibilities that extend beyond mere teaching planning and preparation. Academicians are responsible for accomplishing various duties; for instance, recording student attendance and absenteeism, evaluating assignments, providing consultations, acting as academic advisors, and handling numerous other essential tasks (AGCAS, 2021).

At Universiti Teknologi MARA, lecturers must meticulously record and monitor student attendance over a 14-week class period. To illustrate the workload, imagine a lecturer handling an average of three groups per subject, with two subjects typically assigned. Managing attendance for this many students involves an overwhelming amount of administrative work, making it quite time-consuming and labor-intensive.

Apart from attendance tracking, lecturers are also required to provide and assess multiple assignments, with the number of assessments varying based on the subject's nature. Subjects with a higher weightage for summative assessments (coursework) compared to formative assessments (final exams) demand even more evaluations. The COVID-19 pandemic has further complicated this process as all classes have shifted to an online format. Consequently, students now submit their assessments digitally, with lecturers sharing submission links via platforms like WhatsApp and Telegram or send directly to the cloud storage. However, this online submission process has introduced new challenges. Many students failed to adhere to submission guidelines, which often use inconsistent filenames, varying file formats, and different file sizes. As a result, lecturers must manually rename, organize, and sometimes repair these files, which becomes an exhaustive task, especially when managing a large number of students and multiple online assessments.

A study by Panisoara (2020) highlighted the obstacles faced by lecturers during the COVID-19 pandemic, showing that numerous experienced significant stress due to unclear job roles, difficulties in managing online classes, and the fatigue associated with prolonged online teaching. Furthermore, the students became uninterested and lacked responses through online teaching. Without the use of appropriate tools, students may submit their work after the deadline, or in some instances, resort to plagiarism or copying from others through shared cloud storage accessible to all, allowing unethical downloading, editing, and misuse.

To address these challenges, this article introduces an innovative solution: A comprehensive web-based application integrating attendance tracking and assessment submission. This online system would allow the learners to log in to their attendance through mobile phones and upload the softcopy of assessments effortlessly, ensuring consistency in file formats and preventing file corruption. As a result, it would reduce lecturers' workload, with most clerical tasks being automated by the system.

This paper is organized as follows: It begins with a brief introduction to the project, followed by an exploration of related research and previous works in this field. This study outlines the research methodology before moving on to an analysis and discussion of the project's findings. Lastly, suggestions for potential improvement or recommendation of the project are presented in the Conclusion section.

2. LITERATURE REVIEW

As countries grappled with the challenges brought on by the COVID-19 pandemic, a wide range of teaching and learning methodologies have been introduced to sustain the continuation of the learning process and ensure that educational systems continue to function effectively. This unprecedented situation forced a rapid transition from traditional classroom teaching to digital or virtual learning settings.

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In response to the pandemic, most educational institutions, from schools to universities, were compelled to temporarily close their physical campuses and shift their classes and lectures entirely online. This sudden and unplanned transition from offline to online learning posed numerous challenges for educators, students, and even parents. Many institutions were unprepared for such a drastic shift, resulting in a steep learning curve as they adjusted to new technologies and online platforms. As highlighted by Gillett-Swan (2017), the crucial problem was the lack of knowledge and skills in online teaching and learning, which led to disruptions in lesson planning, delivery, and student engagement. Another significant challenge of this pandemic was the observation of learners' performance through the online learning context. According to Mohmmed et. al (2020), evaluating students' abilities, particularly in areas that require practical skills, technical competencies, and hands-on experience, became increasingly difficult in an online setting. For instance, courses that rely heavily on lab work, field studies, or teaching practicum faced hurdles in replicating t3hese experiences in a virtual environment. In addition, students learning such subjects found it challenging to gain the same level of understanding and skill development as they would in a traditional classroom or laboratory setting.

Moreover, teachers struggled to design assessments that could accurately measure students' practical knowledge and competencies in an online format. This situation raised concerns about academic integrity, as the remote nature of assessments made it easier for some students to be involved in unethical practices. Consequently, teachers had to explore other approaches for assessment types, such as open-book examinations, group project assignments, and online presentations, to ensure that the learning outcomes of students are fairly evaluated. Furthermore, teachers were required to manually monitor and record student attendance, as well as calculate the total absenteeism percentage for each semester. This manual process posed several challenges, including the risk of buddy signing, misplaced attendance sheets, and difficulties in controlling student absenteeism (Zuanuwar, 2020).

In response to the evolving demands of teaching methods brought about by the global pandemic, educational experts have developed innovative online applications designed to manage various aspects of student learning more effectively. These advanced systems are capable of handling multiple tasks, such as tracking student attendance, facilitating assignment submissions, and streamlining the evaluation process. Many higher education institutions have adopted various Student Attendance Management Systems encompassing internet-based solutions such as web-based and mobile-based systems, as well as other computerized attendance methods. As highlighted by Anitha et al. (2016), a web-based Attendance Management System incorporating SMS technology to inform parents about their children's attendance significantly boosts students' motivation and sense of responsibility in attending classes. This proactive approach ensures that students are more likely to be present and accountable.

Furthermore, some universities have implemented QR code technology to record attendance, which allows attendance data to be stored directly on the server (Anitha et al., 2016). The use of QR codes accelerates data entry and minimizes errors, making the process more efficient and reliable. In many higher education institutions, lecturers evaluate overall attendance throughout the semester to determine if students are eligible to sit for their final examinations (Benyo et al., 2012). This emphasizes the importance of accurate attendance records and how technology can streamline this critical aspect of academic life. Vadvala (2024) proposed a digital attendance system to minimize the time spent on traditional pen-and-paper methods. His innovative solution integrates Radio Frequency Identification (RFID) sensors, Bluetooth devices, Wi-Fi networks, facial recognition, and fingerprint-based decentralized sensors, resulting in a highly accurate and nearly error-free attendance tracking process. Ishaq and Bibi (2023) have proposed similar project to build a real-time attendance tracking system by combining the RFID, the Google Sheets forms and the Internet of Things (IoT), to ensure accuracy of attendance monitoring.

In addition to attendance management, universities have increasingly encouraged the use of Learning Management Systems (LMS) for submitting assessments. As an example, the University of Southern Queensland (USQ) in Australia introduced two LMS platforms, Writely and Moodle, which enabled

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students to send their assignments online (Petrus & Sankey, 2007). Both learners and educators replied encouragingly to these platforms, as they simplify the assignment submission process and facilitate timely feedback. The convenience and efficiency provided by these systems enhance the overall teaching and learning experience.

Almost the same application system has been constructed focusing on the submission of assignments, online grading, and viewing of assessment results (Sam, 1998). This system allows lecturers to upload files or question papers, grant authorized students access to view and respond to questions, export grades to a spreadsheet, send a warning message about assignment deadlines to students, and share graded assessments with students. Such systems not only streamline the assignment submission process but also ensure that students and lecturers can manage coursework more effectively. Abu Bakar (2025) asserts that online submission systems positively influence educational quality, promote learner autonomy, and improve institutional efficiency. Additionally, they enhance grading transparency, enable timely feedback, and support the development of digital literacy among both students and educators.

Moreover, Eaganathan and Maruf (2018) proposed an advanced assessment submission system, which incorporates encryption algorithms and cryptographic technology to secure assignment submissions, ensuring data integrity and confidentiality. One of the notable features of this system is that students can check the plagiarism percentage before submitting their assignments, which encourages originality and reduces academic misconduct. After the lecturer has graded the assignment, students are then allowed to view their work and the associated feedback. The system also sends automated notifications via email or SMS to remind students of upcoming deadlines or late submissions. These features significantly enhance the system's integrity and improve overall user satisfaction.

Research in tertiary education has demonstrated that the implementation of Learning Management Systems (LMS) significantly enhances the assessment experience. These systems contribute to a marked reduction in paper consumption (Ellis & Reynolds, 2013) and simplify the management of grading (Ellis & Reynolds, 2013). Additionally, LMS provides more space for comments and enables marking from any location (University of Glamorgan, 2012), besides incorporating rubrics and in-text comments (Ellis & Reynolds, 2013), as well as allowing for quicker grading of certain assessments (Buckley & Cowap, 2013). Overall, these advancements facilitate a more efficient and effective approach to student assessment and feedback in higher education.

3. METHODOLOGY

The Integrated Web-Based Record Management System for monitoring students' attendance and assignment submissions was designed using the System Development Life Cycle (SDLC) waterfall model. According to Dora and Dubey (2013), the SDLC is a structured approach consisting of five distinct phases: Analysis, Design, Implementation, Testing, and Maintenance. The process begins with a comprehensive analysis to understand system requirements, followed by designing the system architecture. Implementation involves the real codes, while the testing phase ensures that the system fulfills the user requirements and reliability. Finally, the maintenance phase addresses any system updates or issues, ensuring the system remains efficient and effective over time. This structured approach secures the system's robustness and adaptability.

Fig. 1 illustrates the flow of the System Development Life Cycle (SDLC) phases, progressing sequentially from the analysis stage to the enhancement or maintenance phase. The SDLC framework offers developers the flexibility to revisit earlier phases, allowing for necessary modifications or corrective actions when required. The analysis phase is particularly critical within the SDLC process, as it involves identifying the core business requirements to guide the project. During this phase, data collection is essential, and the gathered information will be verified, frequently revised, and tallied with the original system functionality to ensure accuracy and relevancy. Defining the project's problem statements is imperative, as it ensures

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that the objectives are measurable and achievable. To support this process, formal meetings with real users should be engaged as the key elements for data collection, providing valuable insights into user needs and expectations. This comprehensive approach confirms that the system development aligns with organizational goals and user requirements.

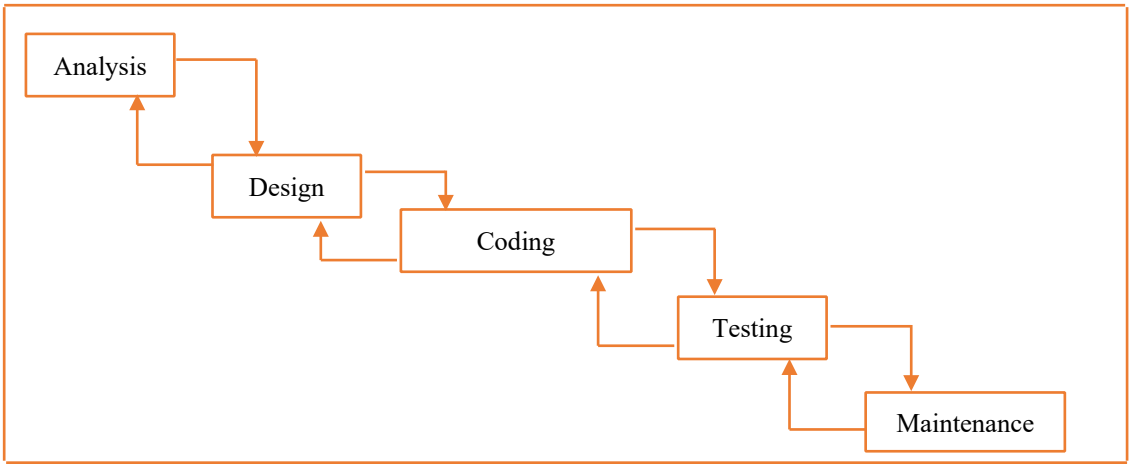

Fig. 1. System Development Life Cycle (SDLC)

The analysis documentation was presented, approved, and validated by primary users and senior management. Following this, the design phase commenced, focusing on incorporating an integrated database with a strong integrity structure, system interactivity, functionality, and relevant aspects of current technology demands. To expedite the development process, the prototyping methodology was employed, which allowed the design, implementation, and testing phases of the SDLC to be executed concurrently (Tavolato & Vincena, 1984). This approach significantly reduced project duration and costs. The initial functional prototype was tested by primary users and developers, and any necessary corrective actions were promptly undertaken to enhance the system. It was iteratively refined and re-evaluated until no further issues were identified by the users. In addition, the developers carried out thorough testing, taking into account factors like database integrity, network operation, concurrency issues, and security.

Following several SDLC cycles, the system was successfully deployed and is now being used by degree and diploma students at the Faculty of Computer & Mathematical Sciences, Universiti Teknologi MARA, Perlis branch. It is now in the process of being expanded to all students at the faculty level, demonstrating the system's scalability and adaptability. This thorough and structured approach to testing and system evaluation ensures the development of a reliable and efficient web-based system.

The system was evaluated by the same cohort of students to assess its functionality. Approximately 111 students have responded to the online questionnaire. An online questionnaire was designed, requiring students to provide sincere feedback on various aspects, including the system's design, features, requirements, and overall functionality. The questionnaire utilized a 5-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree," to capture the students' perceptions and opinions on the system's effectiveness. To ensure the questionnaire's reliability, the items' internal consistency was evaluated using Cronbach's alpha. This coefficient assesses how well the items in a scale are related to one another and whether they collectively measure the intended construct. With values ranging from 0 to 1, a higher Cronbach's alpha indicates stronger reliability. For this study, Cronbach's alpha was calculated for the 12 items, confirming that the instrument was consistent and reliable for measuring the intended variables.

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The responses were analyzed using descriptive statistics, including the calculation of mean scores and standard deviations for each questionnaire item to determine overall trends in student feedback. The means were examined to provide deeper insights into the data, helping to identify specific strengths and areas for improvement. The analysis also included hypothesis testing using a one-sample t-test to determine whether the mean scores for all 12 questions were significantly greater than 4. This approach was used to confirm that the average scores exceeded the benchmark value, reflecting positive feedback from the students. It aims to gather insights that will guide future enhancements. By analyzing the students' responses, the development team will identify areas for improvement, ensuring that the system effectively meets user needs and expectations. This feedback loop is crucial for fostering continual growth and refinement in system performance.

4. RESULT AND DISCUSSION

The Integrated Web-Based Record Management System for Students' Attendance and Assessment Submissions was developed using HTML and PHP, with MySQL serving as the database. As outlined in the previous section, this web-based system comprises two main modules: The first records student attendance, while the second handles the management of students' assessment submissions. The following table outlines the business requirements for both modules, as specified by the users.

Table 1. Points as recommended by the users for the Attendance and Assessment Submission module

Attendance Module	Assessment Submission Module
● Students are permitted to log their attendance only during the class. ● Students can upload documentation as evidence if they are absent for a valid reason. ● Lecturers can update attendance if students forget to log in during the class. ● Students can view their attendance records. ● The system displays the attendance status and the percentage of attendance up to the current date. ● The system can send email notifications to students should they be absent. ● The system generates a list of absentees for a specific class and date. ● Only authorized users are permitted to log in to the web-based system. ● Only documents in valid formats and within the specified file size limit are allowed to be uploaded. ● Students can update their information, such as contact numbers and electronic mail. ● The system provides a detailed analysis of students' attendance records, reflecting their overall attendance performance.	● Only authorized users are permitted to upload assessments. ● Students select the type of assessment they wish to upload. ● Only documents in valid formats and within the specified file size limit are allowed to be uploaded. ● Students can verify and confirm their assignment submission in the system. ● Lecturers can easily download submitted assessments from the system before grading. ● Graded assessments can be easily re-uploaded to the system before being returned to the students. ● Students can view their assessment grades and download the graded assignments. ● Students can also view their overall marks or coursework grades.

Fig. 2 displays the front page of the Attendance & Assessment Management Systems or AAMS.

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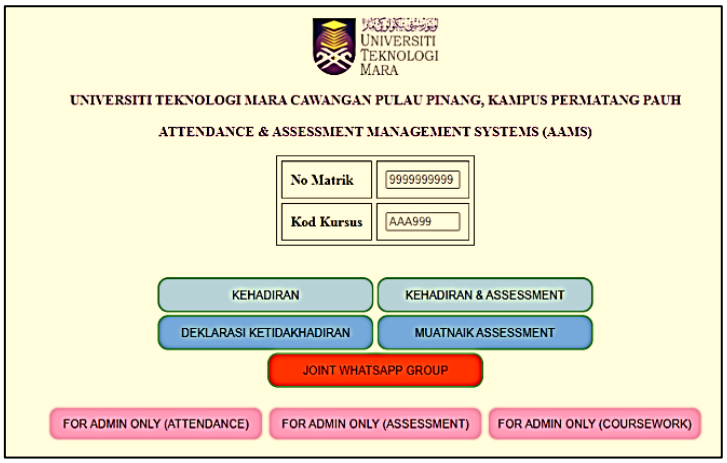

Fig. 2. The main menu of AAMS

The following page has two main modules, namely attendance and assessment submissions. Access for the users is differentiated by the colour of the buttons; the blue button is specifically for students while the pink buttons are for the educators and the system administrator. The pink buttons are hidden from students, as they are restricted by the IP (Internet Protocol) address of the system administrator. Basic student profiles, including student matric number, student name, program, part, and course code, are retrieved from the Student Information Management Systems (SIMS) and integrated into the AAMS database, ensuring that only authorized students can access the system. To log in for attendance, students must enter their matric number and subject code. Once logged in, the system records a timestamp of their attendance. Access is permitted only during the allocated class time or designated slot.

Meanwhile, Fig. 3 illustrates a platform for students to upload documents, such as the medical certificate form, or any relevant documents as evidence if they cannot attend their class. The student must upload the documents or evidence and make sure the file is in PDF format. The system only accepts the size of a document of less than 2 MB. The system will upload the documents for the authorized student ID only. This feature is applied for assessment submission and declaration of absenteeism modules.

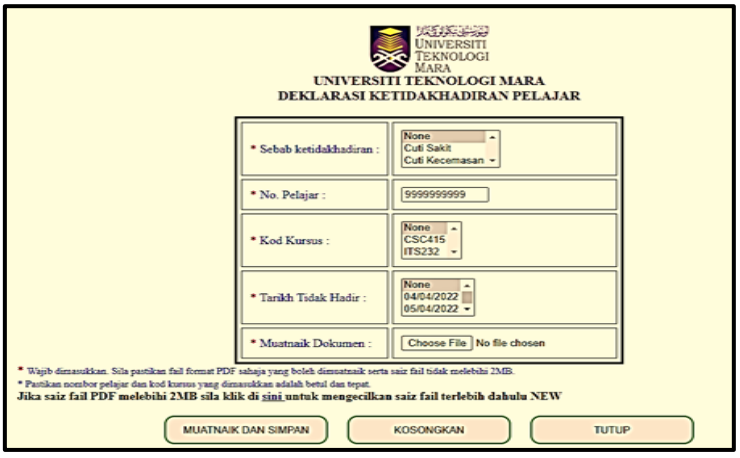

Fig. 3. Interface to upload the evidence of absenteeism

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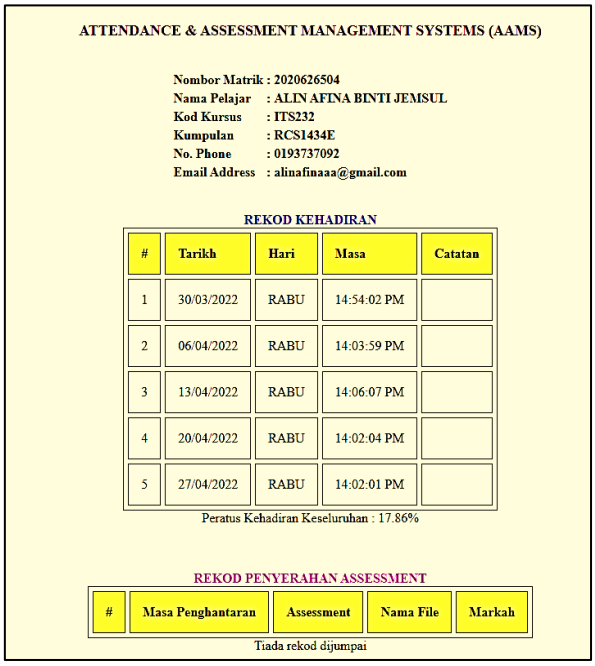
Fig. 4 provides a special feature in which the users can view details of individual attendance records and assessment submissions. From this figure, the students can keep track of their details record of attendance and proof that assignments have been submitted successfully.



ATTENDANCE & ASSESSMENT MANAGEMENT SYSTEMS (AAMS)

Nombor Matrik : 2020626504
Nama Pelajar : ALIN AFINA BINTI JEMSUL
Kod Kursus : ITS232
Kumpulan : RCS1434E
No. Phone : 0193737092
Email Address : alinafinaaa@gmail.com

REKOD KEHADIRAN

#	Tarikh	Hari	Masa	Catatan
1	30/03/2022	RABU	14:54:02 PM	
2	06/04/2022	RABU	14:03:59 PM	
3	13/04/2022	RABU	14:06:07 PM	
4	20/04/2022	RABU	14:02:04 PM	
5	27/04/2022	RABU	14:02:01 PM	

Peratus Kehadiran Keseluruhan : 17.86%

REKOD PENYERAHAN ASSESSMENT

#	Masa Penghantaran	Assessment	Nama File	Markah

Tiada rekod dijumpai

Fig. 4. Interface of students attendance and assessment submission records

Additionally, on this page of the platform, the students will be notified about their attendance performance, and they have to make sure that the percentage of class attendance is more than 80% in 14 weeks of the academic calendar. If they fail to fulfil this regulation, they cannot sit the final examination as the penalty. The students can check their assignment results; assessments that have been marked by the lecturer will be returned through this platform. This interface serves as a one-stop page, allowing students to monitor their attendance and coursework progress.

Administrators or lecturers have special privileges to review the formative assessment marks and the current attendance percentage, as illustrated in Fig. 5 and Fig. 6 below.

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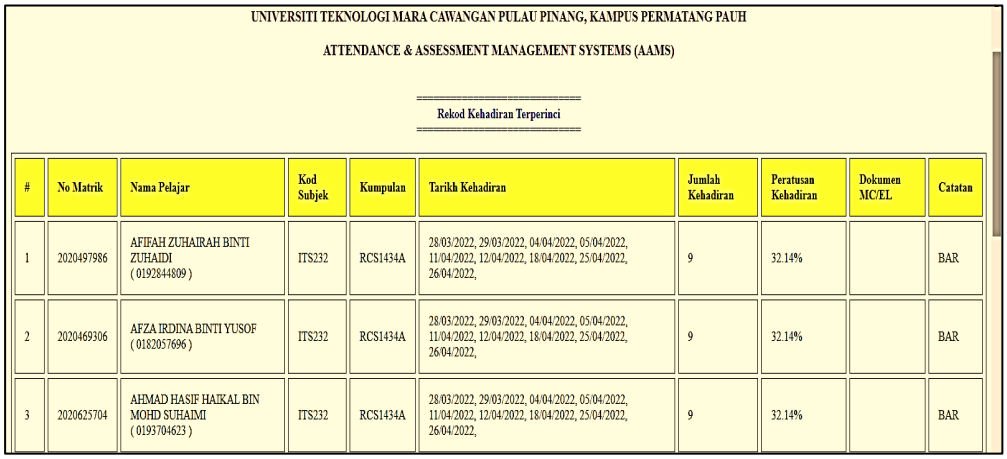

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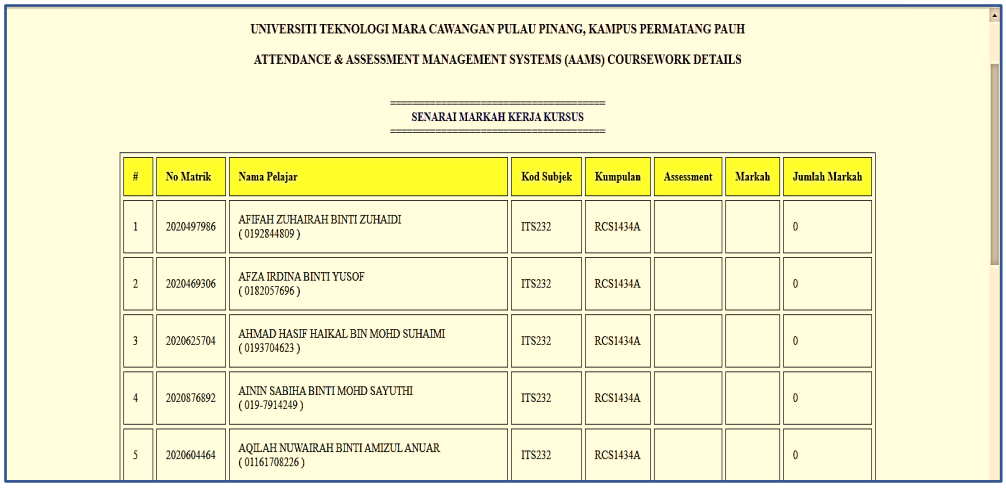
ATTENDANCE & ASSESSMENT MANAGEMENT SYSTEMS (AAMS)

Rekod Kehadiran Terperinci

#	No Matrik	Nama Pelajar	Kod Subjek	Kumpulan	Tarikh Kehadiran	Jumlah Kehadiran	Peratusan Kehadiran	Dokumen MC/EL	Catatan
1	2020497986	AFIFAH ZUHAIRAH BINTI ZUHAIDI (0192844809)	ITS232	RCS1434A	28/03/2022, 29/03/2022, 04/04/2022, 05/04/2022, 11/04/2022, 12/04/2022, 18/04/2022, 25/04/2022, 26/04/2022,	9	32.14%		BAR
2	2020469306	AFZA IRDINA BINTI YUSOF (0182057696)	ITS232	RCS1434A	28/03/2022, 29/03/2022, 04/04/2022, 05/04/2022, 11/04/2022, 12/04/2022, 18/04/2022, 25/04/2022, 26/04/2022,	9	32.14%		BAR
3	2020625704	AHMAD HASIF HAIKAL BIN MOHD SUHAIMI (0193704623)	ITS232	RCS1434A	28/03/2022, 29/03/2022, 04/04/2022, 05/04/2022, 11/04/2022, 12/04/2022, 18/04/2022, 25/04/2022, 26/04/2022,	9	32.14%		BAR

Fig. 5. Interface of student attendance performance



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ATTENDANCE & ASSESSMENT MANAGEMENT SYSTEMS (AAMS) COURSEWORK DETAILS

SENARAI MARKAH KERJA KURSUS

#	No Matrik	Nama Pelajar	Kod Subjek	Kumpulan	Assessment	Markah	Jumlah Markah
1	2020497986	AFIFAH ZUHAIRAH BINTI ZUHAIDI (0192844809)	ITS232	RCS1434A			0
2	2020469306	AFZA IRDINA BINTI YUSOF (0182057696)	ITS232	RCS1434A			0
3	2020625704	AHMAD HASIF HAIKAL BIN MOHD SUHAIMI (0193704623)	ITS232	RCS1434A			0
4	2020876892	AININ SABIHA BINTI MOHD SAYUTHI (019-7914249)	ITS232	RCS1434A			0
5	2020604464	AQILAH NUWAIRAH BINTI AMIZUL ANUAR (01161708226)	ITS232	RCS1434A			0

Fig. 6. Interface of student formative assessment marks (all marks are 0 as the marking of assessment submitted is still ongoing)

The feedback on system functionalities was given and collected from students that already used the system for one semester. An online questionnaire was constructed and shared with the students to give feedback and views for future system enhancements. The internal consistency of the survey instrument was assessed using Cronbach's alpha coefficient, which evaluates how reliably the items in the questionnaire measure the same underlying construct. The Cronbach's alpha coefficient for the 12-question survey was found to be 0.965, indicating a high level of internal consistency, as values above 0.9 are generally considered excellent (George & Mallery, 2024).

After evaluating the questionnaire's reliability, the analysis proceeded with descriptive statistics to summarize and interpret the data, providing an overview of the respondents' demographic information and their feedback on the system. Table 2 displays the students' demographic information, offering insights into the sample's composition.

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Table 2. Demographic

Variable	Category	Frequency	Percentage
Level	Diploma	41	36.9
	Degree	70	63.1
Gender	Male	24	21.6
	Female	87	78.4
Semester	Sem 1	104	93.7
	Sem 2	7	6.3

The demographic analysis of the survey participants provides a clear overview of the distribution of respondents based on academic level, gender, and semester. A total of 111 students participated in this study, with the majority being degree students, accounting for 63.1% (n = 70)**,** while diploma students made up 36.9% (n = 41)**.** This indicates that the system was evaluated by a diverse group of students, though degree students represented a larger proportion of the sample. In terms of gender, the distribution showed a notable majority of female respondents, comprising 78.4% (n = 87)**,** compared to male respondents, who accounted for only 21.6% (n = 24)**.** The gender imbalance may suggest a stronger representation of female students in the surveyed cohort, potentially reflecting the demographics of the academic programs involved or the accessibility of the survey.

The majority of respondents were first-semester students, representing 93.7% (n = 104)**,** while second-semester students constituted a much smaller group, at only 6.3% (n = 7)**.** It suggests that the system was predominantly evaluated by students new to their academic programs. First-semester students are likely to engage more frequently with tools like the AAMS system as they adjust to academic expectations, which might explain their higher representation.

Following the demographic analysis, this study proceeded to examine the mean scores and standard deviations for each of the 12 questions in the questionnaire. This analysis aimed to provide a clearer understanding of the central tendencies and variability in the respondents' feedback. The results are summarized in Table 3, which presents the mean and standard deviation values for all 12 items.

Table 3. Mean and standard deviation of feedback on survey questions

Item	Mean	Std Dev
Q1 - I find the AAMS system very useful.	4.6036	0.5765
Q2 - I find the interface of AAMS easy to use.	4.5315	0.64413
Q3 - I have a positive attitude on using AAMS.	4.5495	0.61406
Q4 - Overall, I like to use AAMS.	4.5045	0.64489
Q5 - I will recommend all lecturers to apply AAMS.	4.4865	0.68576
Q6 - I find the system running smoothly without failures.	4.3243	0.67638
Q7 - I am satisfied with the system's interface.	4.4324	0.64133
Q8 - I am satisfied with the system's features.	4.4505	0.5837
Q9 - Features provided in AAMS are really needed by all students.	4.4414	0.70948
Q10 - The output/reports from AAMS are really valuable.	4.5135	0.60098
Q11 - The system is accessible anywhere.	4.5586	0.59825
Q12 - The system is accessible anytime.	4.5676	0.66908

Following the presentation of the table, the descriptive statistics for the AAMS system survey painted a compelling picture of students' perceptions and experiences with the system. Specifically, the mean and standard deviation values for questions Q1 to Q12 highlighted consistent positive feedback. The mean scores for all questions exceeded 4.3, underscoring strong agreement among respondents regarding the

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system's effectiveness. Notably, Q1 ("I find the AAMS system very useful") recorded the highest mean of 4.6036, signifying widespread recognition of the system's utility. Meanwhile, Q6 ("I find the system running smoothly without failures") recorded the lowest mean of 4.3243, though it remained firmly within the positive range. These results collectively suggest that students view the AAMS system as an essential tool that simplifies critical academic processes, such as attendance tracking, assignment submission, and evaluation.

In terms of variability, the standard deviation values ranged between 0.5765 and 0.70948, showing a relatively low to moderate spread in students' responses. For instance, Q1 has the lowest standard deviation of 0.5765, signifying a high level of agreement and consistency among students about the usefulness of the system. Similarly, Q11 ("The system is accessible anywhere") and Q10 ("The output/reports from AAMS are really valuable") exhibited low standard deviations of 0.59825 and 0.60098, respectively, suggesting a strong consensus regarding the accessibility and value of the system's outputs. On the other hand, Q9 ("Features provided in AAMS are really needed by all students") has the highest standard deviation of 0.70948, indicating a slightly broader range of opinions among students about the necessity of the system's features.

Comparing the mean and standard deviation values collectively, it is evident that questions with higher mean scores tend to generally have lower standard deviations, reflecting a strong alignment in students' positive views. For example, Q1 and Q11, which both have high mean scores, also displayed lower standard deviations, reinforcing the consistency in students' agreement. Conversely, questions with slightly lower mean scores, such as Q6 and Q9, demonstrated relatively higher standard deviations, suggesting that these aspects of the system may be perceived differently by a small proportion of students. This disparity might point to areas for further exploration or enhancement to meet the diverse expectations of users.

Overall, the combination of high mean scores and low to moderate standard deviations across all questions indicates that the AAMS system is well-received by students, with minimal disagreement. However, a closer examination of questions with higher variability, including Q9, could provide valuable insights into potential areas for improvement. These findings support the conclusion that the system has successfully met its objectives, while also highlighting opportunities for refining its features to cater to broader user needs.

To further validate the statistical significance of the findings, a one-sample t-test was conducted to determine whether the mean scores for the survey items were significantly higher than the benchmark value of 4, which represents agreement on the Likert scale. This test assesses whether students' positive perceptions of the AAMS system are statistically significant and exceed the threshold for general agreement. The results of the t-test, as presented in Table 4, confirmed that all mean scores for Q1 to Q12 were significantly greater than 4, with p-values less than 0.05. These results provide strong evidence that the AAMS system is not only well-received but also highly effective in fulfilling its purpose of streamlining attendance tracking, assignment submission, and evaluation processes. High mean scores, such as ≥ 4.0 on a 5-point Likert scale, usually reflect positive perceptions or satisfaction and show that respondents agree or strongly agree with the statements. The interpretation of mean values above the neutral midpoint as high/positive perception is supported by research literature (Rokeman, 2024).

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Table 4. One-Sample T-Test Results (Test value > 4)

Item	p-value (1- tailed)
Q1 - I find the AAMS system very useful.	0.000
Q2 - I find the interface of AAMS easy to use.	0.000
Q3 - I have a positive attitude on using AAMS.	0.000
Q4 - Overall, I like to use AAMS.	0.000
Q5 - I will recommend all lecturers to apply AAMS.	0.000
Q6 - I find the system running smoothly without failures.	0.000
Q7 - I am satisfied with the system's interface.	0.000
Q8 - I am satisfied with the system's features.	0.000
Q9 - Features provided in AAMS are really needed by all students.	0.000
Q10 - The output/reports from AAMS are really valuable.	0.000
Q11 - The system is accessible anywhere.	0.000
Q12 - The system is accessible anytime.	0.000

It can be confidently concluded that students' perceptions of the AAMS system are statistically significant and highly positive. These findings demonstrate that the AAMS system is not only perceived as useful and efficient by most students but also significantly meets their expectations in terms of functionality, ease of use, and accessibility. The consistently high ratings across all survey items suggest that the system has effectively achieved its objectives in streamlining attendance tracking, assignment submission, and evaluation processes. Moving forward, these positive results will provide valuable insights into further refinement and potential widespread adoption of the system.

5. CONCLUSION

In conclusion, the integration of technology in attendance management and assessment submission systems has proven to be highly effective in higher education institutions. These advanced systems not only facilitate efficient data management and reduce errors but also enhance communication, accountability, and the overall educational experience for students and lecturers alike. The positive feedback from students regarding the AAMS system demonstrated by the high mean scores and statistically significant results highlights its effectiveness in meeting its intended objectives. The system has significantly streamlined key academic processes, such as attendance tracking, assignment submission, and evaluation, ultimately contributing to a more efficient and organized learning environment.

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7. CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

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8. AUTHORS' CONTRIBUTIONS

Jamal Othman: Introduction, Literature Review & Methodology; **Siti Balqis Mahlan**: Data Analysis, Result & Discussion; **Maisurah Shamsuddin**: Result & Discussion; **Syarifah Adilah Mohamed Yusoff**: Literature Review & Editing; **Zalina Othman**: Data Collection & System Development.

9. REFERENCES

Abu Bakar, S. (2025). The impact of online submission systems on teaching practice in digital education environments: A case study of Open University Malaysia. *Muallim Journal of Social Sciences and Humanities*, *9*(S1), 231-239. https://doi.org/10.33306/mjssh/345

AGCAS. (July, 2021). *Higher education lecturer*. Prospects. https://www.prospects.ac.uk/job-profiles/higher education-lecturer

Anitha V. P., Krishna A, Kshama P.M., Correa M. (2016). Web service for student attendance management system, *5*(3).

Benyo B, Sodor B, Doktor T, Fördős G. (2012). Student attendance monitoring at the university using NFC. In *Wireless Telecommunications Symposium 2012* (pp. 1-5). IEEE. https://doi.org/10.1109/WTS.2012.6266137

Buckley, E. & Cowap, L. (2013). An evaluation of the use of Turnitin for electronic submission and marking and as a formative feedback tool from an educator's perspective. *British Journal of Educational Technology*, *44*(4), 562-570. https://doi.org/10.1111/bjet.12054

Dora, S.K. and Dubey, P. (2013). Software Development Life Cycle (SDLC) analytical comparison and survey on traditional and agile methodology. *Journal of Research in Science & Technology*, *2*(8), 22-30.

Eaganathan, U., & Md. Maruf Hasan, S. (2018). Proposed literature review on ASIA Pacific University assignment submission and feedback system for future development. *International Journal of Engineering & Technology*, *7*(2.33), 480-483. https://doi.org/10.14419/ijet.v7i2.33.14815

Ellis, C. & Reynolds, C. (2013). *EBEAM Final Report*. https://ipark.hud.ac.uk/sites/default/files/EBEAM_Project_report_compressed.pdf

George, D., & Mallery, P. (2024*). IBM SPSS statistics 29 step by step: A simple guide and reference*. Routledge. https://doi.org/10.4324/9781032622156

Gillett-Swan, J. (2017). The challenges of online learning: Supporting and engaging the isolated learner. *Journal of Learning Design*, *10*(1), 20-30. https://doi.org/10.5204/jld.v9i3.293

Ishaq, K. & Bibi, S. (2023*).* IoT based smart attendance system using RFID: A systematic literature review. *arXiv*. https://doi.org/10.48550/arXiv.2308.02591

Mohmmed, A. O., Khidhir, B. A., Nazeer, A., & Vijayan, V. J. (2020). Emergency remote teaching during the Coronavirus pandemic: The current trend and future directives at Middle East College Oman. *Innovative Infrastructure Solutions*, *5*(3), 72. https://doi.org/10.1007/s41062-020-00326-7

Panisoara, I.O.; Lazar, I.; Panisoara, G.; Chirca, R.; Ursu, A. S. (2020). Motivation and continuance intention towards online instruction among teachers during the COVID-19 pandemic: The mediating effect of burnout and technostress. *International Journal of Environmental Research and Public Health*, *17*(21), 8002. https://doi.org/10.3390/ijerph17218002

https://doi.org/10.24191/jcrinn.v10i2.539

Petrus, K., & Sankey, M. (2007, January). Comparing Writely and Moodle online assignment submission and assessment. In *Proceedings of the 3rd International Conference on Pedagogies and Learning*. https://www.researchgate.net/publication/242044743

Rokeman, N. R. M. (2024). Likert measurement scale in education and social sciences: Explored and explained. *EDUCATUM Journal of Social Sciences*, *10*(1), 77-88. https://doi.org/10.37134/ejoss.vol10.1.7.2024

Sam H. (1998). HWSAM: A web-based automated homework submission system. In *1998 ASEE/IEEE Frontiers in Education Conference Proceedings (FIE '98)* (pp. 580-582). IEEE. https://doi.org/10.1109/FIE.1998.738744

Sanusi, N., Zulkifli, H., & Hamzah, M. I. (2025). Digital technology in classroom assessment: A bibliometric study. *TEM Journal*, *14*(1), 551-561. https://doi.org/10.18421/TEM141-49

Tavolato, P., & Vincena, K. (1984). A prototyping methodology and its tool. In *Approaches to Prototyping* (pp. 434-446). Springer. https://doi.org/10.1007/978-3-642-69796-8_38

University of Glamorgan (2012). *Evaluation of assessment diaries and grade mark at the University of Glamorgan*. http://jiscdesignstudio.pbworks.com/w/file/67927168/JISC_Assessment_and_Feedback_Glamorgan_Final_Project_Report_post_JISC_feedback_Nov_2012.docx

Vadvala, A. (2024). A comprehensive review of digitalized attendance systems for various institutions. *International Journal of Engineering Applied Sciences and Technology*, *09*(03), 119-123. https://doi.org/10.33564/IJEAST.2024.v09i03.011

Zuanuwar, M. (2020). The influence student attendance management system on academic performance. *Journal of Social Transformation and Education*, *1*(1), 26-62.

https://doi.org/10.24191/jcrinn.v10i2.539