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Students Attendance Management System with Data Analytics Using Near Field Communication Technology

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ABSTRACT

The checking of students' attendance is a tiresome activity on the part of the faculty when done manually. To mitigate some challenges encountered in the current process, the proponent developed a web-based attendance management system with data analytics using near-field communication technology. This study specifically aims to evaluate the performance of both manual and developed systems regarding usability, reliability, and performance efficiency.

This study used mixed methods of research, such as developmental and descriptive-evaluative. The Agile Method was utilized throughout the development process of the system. At the same time, the descriptive-evaluative was employed to ensure that the system being developed was evaluated as to its performance using the adapted survey questionnaire from ISO 25010 Software Quality and Product Model.

The data were treated using statistical tools such as mean, standard deviation, ANOVA, and t-test to show specific findings and significant results. The study revealed a difference of 2.05 points in the overall mean of the two (2) attendance systems, and it shows that the majority of the respondents had seen the importance of the developed system. Further, the results also revealed a significant difference between the manual and the developed system, which indicates that the developed system is "so much useful," "very reliable," and "very efficient."

Keywords: students' attendance management system, data analytics, near-field communication technology

1. INTRODUCTION

Nowadays, the integration of Information Technology (IT) into the day-to-day operations of every institution has become vital. Globally, in the context of academic institution, it benefits both the governance section, which includes the administrative services, and the teaching and learning process directly concerned with the institution's primary clientele who are the learners.

The use of technology in education is becoming more common as most of educational institutions strive to deliver the quality education possible for their learners (Lim, 2021). It has become prevalent in the

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education sector as it helps teachers work efficiently and productively. Likewise, it also helps students to learn more meaningfully as it conforms to the demands of the digital era. Faster communication, ease in data gathering, secured electronic storage, quick data transmission, accessibility of data, well-timed availability of reports, and the continuous protection of records are some of the advantages when IT is applied.

In the advent of technology, every work environment depends on computerized systems that are extensively utilized. It is helpful to include systems management automation in academic institutions, particularly in public schools with more pupils per classroom than the national average.

In the Department of Education, there have been modifications in the curriculum of elementary and secondary schools. Introducing the K-12 Basic Education Program is one of the country's most significant changes. It outlines initiatives and projects to expand and improve primary education delivery in the country (Briones, 2019). Thus, the demand for technology has been numbered. Rapid transformations that are mandated have taken effect across all regions, divisions, districts, and schools. Integrating technology into education is now a requirement in 21st-century teaching, where teachers act as class facilitators instead of being the host of all the learning.

The monitoring of student's attendance has been identified as a critical factor or difficulty in representing academic accomplishments and success at any educational institution (Rjeib, 2018). Hence, one must conform to regular class attendance to increase a learner's intellectual competence in the classroom setting. According to Dixon & Abuzneid (2020), students with a higher attendance rate generally perform better than students who tend to have no show. Regular attendance fulfills several important goals, especially in primary and secondary education. It plays an essential role in enhancing student performance because it helps the student to submit assignments on time, enhances collaboration among learners, increases the test scores, improves the General Weighted Average (GWA), increases the student confidence, increases understanding of basic concepts, quickly understands every point, achieves greater understanding, and improve coordination with teachers and peers. These problems can be surpassed by improving attendance and reducing absenteeism (Khalid, 2017).

There have been several state-of-the-art developments of attendance management systems, both from foreign and local scales used by different schools and universities embedded with high-end technologies such as Student Attendance Management System Using RFID and Face Recognition by Patel U. et al. (2014) that lets the students tap their IDs against the RDIF Reader and undergoes face scanning for attendance validation and Online Attendance Management System with Automatic Door Unit by Chiagozie O. G. et al. (2015). Consequently, not all developed systems in a specific institution are doable for use on the other.

The Department of Education is mandated to monitor class attendance as it is consolidated at the end of the month through the official School Form 2 (Daily Attendance Report) and submitted to the central office through the Basic Education Information Technology (BIES) Officer.

However, the learners' attendance is manually checked before each class starts and later consolidated by the Curriculum Heads in both morning and afternoon sessions and is submitted to the Basic Education Information System (BEIS) Office daily. The problems in the current manual system are the redundancy and tediousness of processes which consume much time and hinder productivity in the course of teaching and learning.

Thus, a customized web-based system was developed that suits the needs of the attendance management process of public secondary high schools in the Philippines. Moreover, it benefits not only the school

personnel but the main clientele who are the students to whom the discussion of lessons will be maximized, the parents whenever they need to check on the attendance record of their child, and the central office for a prompt response in case of random and scheduled data requests.

2. METHODOLOGY

This chapter presents the study's methodology, requirements, specifications, algorithm, and data structure.

Research Design

This study used developmental and descriptive, and evaluative methods of research. Its goal focuses more on the effect of product development on the learners, school personnel involved, and the whole institution in general.

A developmental research approach was used in the study, which is a systematic study of creating, implementing, and assessing educational programs, processes, and products that must fulfill internal consistency and effectiveness standards (Richey, 2023). The descriptive and evaluative method describes the process and impact of the creation and implementation of a system. The findings are frequently contextualized within the context of the implementation environment.

A study by Alharbi (2015) used an evaluative analysis method to verify that the textbook is appropriate and capable of aiding instructors in accomplishing their educational objectives. Each checklist had varied findings, demonstrating that alternative lists may be constructed to evaluate different language abilities, aims, and characteristics. This study is anchored to the abovementioned methodologies as it seeks to assess and compare the changes and progress in the attendance rate of students in the period of utilization of the developed system. The researcher aims to see the upshot of the mindset of the students on having an automated attendance system, leaving them the thought that their attendance and absences are being closely monitored by their advisers and the school's unit heads. Reports can be easily generated so teachers can have proof in case of conferences.

The study's respondents are a sample population of 8% of learners, advisers, curriculum heads, the school principal, and other involved personnel. It aims to discover the user experience in developing a new solution expected to lessen the ambiguous workloads of the abovementioned individuals. The system may also result in the maximization of time in the teaching-learning process and validates the utilization of the descriptive research method.

The developmental research method is obligatory in this study because it demands the creation of software that automates the above-stated processes needed to attain all the enumerated objectives.

Systems Development Methodology

Figure 4. Agile Methodology Model

Agile is a way of completing work that is actually important. An Agile team, for example, would begin working on each little chunk of work rather than spending hours or days preparing a thorough project plan

that may or may not be appropriate for the project's execution. The team then monitors their progress and continues the development cycle until they have received enough input to establish that they are on the correct road (Bydrec, 2019).

The ability to work iteratively is one of the Agile method's key focus areas. Iterative work is completed in brief cycles in which a tiny portion of the job is completed concurrently. Iterative labor has the advantage of resulting in less work being wasted. It indicates that the required rework will be small if the project changes. Teams no longer have to get too far into the development cycle to discover they need to start again. The developed system opted to follow this methodology because the researcher sees the benefit of having small and detailed deliverables checked daily. Gradual system testing per module is done since respondents and system users, together with the researcher, are just within the locale of the study and are very convenient to collect feedback because the testing process is made as it is supposed to be implemented.

3. **Below are the stages in the Agile Software Development Life Cycle (SDLC) that was used in the development of the web-based** developed **system:**

Planning

A new Agile project starts by defining a clear goal over a gap a project wants to address. When the researcher discussed with the curriculum heads and co-classroom advisers the increasing rate of student absenteeism, the latter suggested developing an attendance system that would, aside from monitoring, give warning to advisers on students with red flags – of consecutive absenteeism and tardiness. User stories were collected for system analysis and database construction.

Designing

The researcher lists the backlog items to be accomplished within a specific timeframe to create a final functional product. Using the FIGMA Online Application, a prototype is designed to provide a visual panorama outlining the developed system's development. (See pictures in the indexes for references). Backlogs are visually presented and are ready to be converted into a system design to be programmed. Changes in the system's features are gradually adapted to the need of the key persons who will use the developed web-based application.

Development

It is the most technical part of the study, where the researcher converts all the blueprints into working software. Since the researcher used a web-based platform, domain name registration, and web hosting are needed to upload the application to produce a live production site where the involved personnel can open their accounts for operation. The development started with the construction of the database based on the crafted Entity Relationship Diagram (ERD) followed by the system'ssystem's front end, which is done locally for easy navigation and quick response.

After working on each sprint, the researcher checks if everything has been accomplished as planned. By the end of the cycle, a functioning software product should be ready for release. The researcher used the KANBAN Method in this developed system to monitor each sprint**.** It is one of the most traditional methods but is very accessible and comprehensive.

Testing

During this step, the researcher creates a high-level timetable to allot a testing phase of the working software. Since Agile projects are expected to have multiple releases, the researcher must prioritize the functions closer to launch. As to the developed system, the priority is the attendance module. A dummy

attendance can be populated to log and check if the input is parallel to what is being recorded in the system database to list initial loopholes.

Deployment

Upon the accomplishment of the testing phase, the locally developed web-based system is uploaded to the production site. The system is accessible to the domain name – http://labangalnhs.com. A new school year has been set, sample sections are created along with the class advisers' accounts, NFC Cards were already registered to the owner's (learner) name cataloged with it, and NFC Card readers were ready to use.

Along with the deployment, there are expected updates in the feature on the developed system, which were patched occasionally to the production site for checking.

Sprint 1 – Registration, Enrollment, and Attendance Checking Module

Planning

It is the core function of the system. The main objective of this module is to consolidate the students' attendance from the end of the advisers. In this stage, the researcher asked for the viewpoint of the class advisers on the manual attendance checking of the students. Generally, the feedbacks were almost the same – time-consuming, redundant, and prone to error. The researcher, and the concerned personnel, convened with the idea of having a multipoint student attendance system where attendance can be checked on the classroom premises. The setup where the card readers are to be placed in the school gate was also suggested but then dissolved because of the possible issue of heavy traffic during peak hours.

Designing

The attendance module is enabled only in the classroom adviser's accounts. The interface has four (4) buttons, namely time in and time out for AM and time in and time out for PM, that must be set first before a learner can tap the NFC card onto the NFC card reader. Should foreign cards be tapped into the readers where it is not registered under the section plugged in, the system displays an error message informing the cardholder that the card is not recognized. The card is just readable in the section where it is enrolled.

Development

Upon building the system's front end, the researcher considered the simplicity of the graphical user interface since non-technical people will also use it. The default date is set to the current date and time of the machine (computer unit), but a customized date picker is also in place for testing purposes.

Testing

It is the stage where the pre-population of the database has taken place. Since this module can consolidate and present the student population, attendance, and absences in graph and list format, the researcher registered dummy actors to test if the graphical data representations are moving accordingly. Test accounts for the classroom advisers, curriculum head, and principal, along with the grade levels with dummy sections, were also created as pre-requisite for the attendance logging that dummy students can perform.

Deployment

The major report, the DepEd School Form 2 (SF2), can be generated with data on students' information, attendance log, and any system activities. To generate reports, the researcher pre-populated the attendance of the dummy actors (students). The latter tapped the cards four (4) times to finish the whole day cycle with different times and statuses since the custom data facility is still open in the testing stage to allow the reenactment of the attendance logging for the past few weeks. This course of pre-population of the database is repeated in the accounts of other dummy class advisers to check the consistency of the outputs.

Sprint 2 – Generating Reports

Planning

The frequent reports needed by the Basic Education Information System (BEIS) In-charge (school registrar) were enumerated so the researcher may include them in the development of the system. This module aims to minimize, if not eliminate, the redundant process of manually collecting the number of updated student populations and daily attendance.

Designing

System User Interface is designed to have minimalist and uniform views. The administrator and teachers have different printing facilities. The administrator has access to all consolidated data, like a list of teachers, sections, and registered and enrolled students of the entire school. In contrast, the teachers only have access to the data under his section.

Development

In developing this module, the researcher used HTML Reporting for generic reports and Excel format to generate the School Form (2). All reports have a grid list for returning data as web and responsive print previews. Generic reports can be printed in different orientations and sizes as needed by the users, except for the SF2 since it has a customized specific format because of the demands of its complexity.

Testing

All reports were smoothly tested for whatever in the grid view is, the same as with the print preview and print output. The reports can be printed in colored and black and white format. In the printing option, the user can select whether or not to show the background graphics, which are indicators of absences and tardiness.

Deployment

The researcher provided a user-friendly facility for printing where users can directly print the needed documents from the system aside from the SF2, which is developed to have an Excel file output that must be downloaded before printing.

Sprint 3 – Generating Suggested Intervention

Planning

This module is anchored to the DepEd Order no.18, S. 1991 – Policy On Absenteeism and Tardiness. Due to the habitual absenteeism and tardiness of the learners, the researcher crafted a module to consolidate the absences and tardiness incurred by the learners and generate suggested interventions depending on the case that transpired.

Designing

In this stage, the school guidance officer helped arrange the conditions to be embedded in the module. The interface can filter the consolidated remarks "by month" so the adviser can review the previous reports as needed.

Development

The statistics were derived from the learners' combined attendance, tardiness, and absences. The researcher presented a basic view with simply the LRN, names of learners, attendance remarks, and suggested interventions, if there are any. Should the learner has no issue with absenteeism, the system will display " fair attendance" or "perfect attendance."

Testing

Upon exhausting the system for possible loopholes, the researcher populated the database by enacting the attendance logs of the learners four (4) times a cycle per card (AM – Time in and out, PM time in and out) to fill several months with different statuses (present – on time, absent, tardy and undertime (went home early) to produce data to check if the embedded conditions are working.

Deployment

After the testing stage, the researcher found no bugs since it has minimal and straightforward conditions. The module has a printing facility where class advisers can print the monthly attendance remarks with suggested interventions.

Evaluation Process

Respondents Jurors

The study on the developed Students' Attendance Management System with Real-Time Data Graphical Representations using Near Field Communication Technology was conducted in Labangal National High School with the participation of five (5) types of respondents. One (1) School Head, four (4) Curriculum Heads from different Grade Levels, one (1) Basic Education Information System Coordinator who acts as the School Registrar, thirty (30) Classroom Advisers, three hundred (300) students – approximately ten (10) students per section were the respondents of this study.

Data Gathering Procedure

Considering the feasibility of the developed study, the response of the higher officials of the organizations to the system is highly needed before the researcher proceeds to the school field. Thus, approval from the Dean of the Graduate School was secured to start the conduct of the study.

To where the system is being deployed, the researcher asked for the permission of the School Principal of Labangal National High School to conduct the study. By then, the latter sends a letter of permission to the Department of Education General Santos City Division, Office of the Schools Division Superintendent, on behalf of the researcher. Approval was granted, so the researcher conducted the study in the selected classrooms with the pertinent documents to the respective class advisers.

Data Gathering Instrument

The researcher used a modified survey questionnaire adapted from the ISO 25010 Software and Data Quality Model. The first part of the questionnaire was used to determine the performance of the SAMS, and the second part was used to compare the SAMS and the manual system. The same set of survey questionnaires was distributed to the five (5) groups of participants, namely the School Principal, ICT Coordinator, BEIS Coordinator, Curriculum Heads, and selected students, to evaluate the developed system.

The following mean and interpretations were used to interpret the SAMS performance regarding usability, reliability, and performance efficiency, as shown in Table 14.

Table 14. The Rating Scale Used to Evaluate the Developed System.

Rating Score	Mean Range	Interpretation
Usability		
1	0.50 - 1.49 %	Near Useless
2	1.50 - 2.49 %	Less Useless

3	2.50 - 3.49 %	Useful
4	3.50 - 4.00 %	So much useful
Reliability		
1	0.50 - 1.49 %	Least Reliable
2	1.50 - 2.49 %	Slightly Reliable
3	2.50 - 3.49 %	Reliable
4	3.50 - 4.00 %	Very Reliable
Performance Efficiency		
1	0.50 - 1.49 %	Least Efficient
2	1.50 - 2.49 %	Less Efficient
3	2.50 - 3.49 %	Efficient
4	3.50 - 4.00 %	Very Efficient

Statistical Tool

The gathered data were subjected to statistical tests. The following statistical methods were used to answer the problems of the study. To determine the performance of SAMS, mean and percentage were used. ANOVA and T-tests were utilized to compare the advantages and disadvantages of manual and automated systems and to test the study's hypothesis, respectively. Results were presented in textual, tabular, and graphical means.

4. RESULTS AND DISCUSSION

This chapter presents the results, analysis, and interpretation of the developmental research according to the order of the objectives of this study.

4.1 Quantitative Results

4.1.1 Developed System (SAMS) Based on Usability

To determine the views on the functionalities, the respondents evaluated the developed system's usability. The results are shown below.

Table 15. The Rated Performance of SAMS and the Manual System Based on Usability.

	Mean	Variance	Observations	Pearson Correlation	Hypothesized Mean Difference	Df	t-Stat	P(T<=t) 1-tail	t Critical one-tail	P(T<=t) two-tail	t Critical two-tail
Manual	1.74	0.6607	338	-0.1822	0	337	-41.80	-.000	1.6493	-.000	1.967

Developed System	3.83	0.0929	338								

Table 15 compares the manual and the developed system in terms of usability. It can be gleaned from the table that the developed system gained the highest mean among indicators, with 3.8 points. Most of the respondents have mainly valued the developed system's usability. Considering the strenuous work of conducting the manual recording of attendance and report generating done every class in a day, most respondents prefer to convert the usage of the developed system.

This result was supported by the study of Osaka (1991), which states that software development aims to create computer systems that people can find helpful.

4.1.2 Developed System (SAMS) Based on Reliability

	Mean	**Variance**	**Observations**	**Pearson Correlation**	**Hypothesized Mean Difference**	**Df**	**t-Stat**	**P(T<=t) 1-tail**	**t Critical one-tail**	**P(T<=t) two-tail**	**t Critical two-tail**
Manual	1.75	0.6678	338	-0.2265	0	337	-40.3	-.000	1.64	-.000	1.967
Developed System	3.80	0.089	338								

The participants evaluated the system's reliability to determine the SAMS' security, correctness, and accuracy of its results. The results are presented below.

Table 16. The Rated Performance of SAMS and the Manual System Based on Reliability.

As Table 16 depicts, the manual system gained a mean of 1.75 while the developed system garners a mean of 3.79. The latter has greatly appreciated the quality of the retrieved information from the database, the kind of detailed data and image produced, the accuracy of the information, and the overall presentation of the data. It clearly shows that the majority of the respondents found the developed system more reliable than the manual system. During the test printing of reports, all inputs matched with the outputs, as compared to the cycle of the manual system which most advisers experienced difficulty finalizing the data before the submission.

Generally, when almost every organization operates using some information system, its reliability is one of the key factors influencing an organization's competitive advantage from using it. Furthermore, in the face of emerging global internet threats, maintaining the reliability, security, and accuracy of the information system in an organization is becoming one of the biggest challenges of IS management (Tworek & Liu, 2018). Thus, it is empirical to conform to a reliability model during the development stage.

4.1.3 Developed System (SAMS) Based on Performance Efficiency

To measure the promptness and timeliness of the run-time response of the SAMS, the performance efficiency of the developed system was evaluated by the participants. The results are presented below.

Table 17. The Rated Performance of SAMS and the Manual System Based on Efficiency.

	Mean	Variance	Observations	Pearson Correlation	Hypothesized Mean Difference	Df	t-Stat	P(T<=t) 1-tail	t Critical one-tail	P(T<=t) two-tail	t Critical two-tail
Manual	1.74	0.6877	338	-0.24116	0	337	-39.36	-.000	1.6494	-.000	1.967
Developed System	3.78	0.0937	338								

Table 17 compares the mean ratings regarding the performance efficiency between the manual and the developed system. It shows that down to the last indicator, the developed system gained higher ratings than the manual system. The computed means indicated that the two (2) samples were interpreted differently. The manual system earned a 1.74 mean rating to show that it is less efficient, and the developed system earned 3.77 to show that it is very efficient.

The results reveal that the majority of the respondents find the process of logging in, time allotment per transaction, the process of retrieving information, and the process of the transition of input to output by the developed system very efficient to use.

Since academic performance is influenced by student attendance, there is a need to intensify the management of attendance monitoring using automated information systems. It can be useful to reduce administrative complexity and increase efficiency in education (Rjeib, 2018).

4.1.4 Overall Performance of SAMS

To measure the overall functionalities of the developed system, it was measured individually in terms of usability, reliability, and performance efficiency. The summary of the results is presented below.

Table 18. The Overall Rated Performance of SAMS and the Manual System.

	Mean	Variance	Observations	Pearson Correlation	Hypothesized Mean Difference	Df	t-Stat	P(T<=t) 1-tail	t Critical one-tail	P(T<=t) two-tail	t Critical two-tail
Manual	1.74	0.5653	338	-0.26454	0	337	-44.74	-.000	1.6493	-.000	1.967

Developed System	3.80	0.0546	338								

Statistics show a significant difference in the manual and the developed system samples across all indicators. It reveals that most respondents have seen the value of the developed system in terms of usability, reliability, and performance efficiency. The variance gained by the manual system is high, noting that some teachers still want to stick with the old and traditional way of recording the students' attendance; others are fine with both since these respondents are open to changes and new learners, but mostly are fervent with the implementation of the developed system because of its advancement in processes.

4.1.5 Significant Difference between the Manual and the Developed System

The check if the null hypothesis is to be rejected or accepted, the mean scores of the manual and the developed system across all indicators were compared. The results are presented below.

Table 19. The Significant Difference between the Manual and the SAMS.

Variables	Group	Mean	Std. Deviation	T-stat	Df	P-value (2-tailed)	Mean dif.	Decision	Interpretation
Usability	Manual	1.74	0.813	-41.80	337	.000	-2.09	Reject the null hypothesis.	There is a significant difference.
	Developed System	3.83	0.305						
Reliability	Manual	1.75	0.817	-40.32	337	.000	-2.04	Reject the null hypothesis.	There is a significant difference.
	Developed System	3.79	0.298						
Performance Efficiency	Manual	1.74	0.829	-39.35	337	.000	-2.03	Reject the null hypothesis.	There is a significant difference.
	Developed System	3.78	0.306						
Overall	Manual	1.74	0.752	-44.74	337	.000	-2.05	Reject the null hypothesis.	There is a significant difference.
	Developed System	3.80	0.306						

Table 19 shows the vast difference between the overall mean to indicate a significant difference between the manual attendance system and the SAMS. These pieces of evidence suffice the decision to reject the null hypothesis.

The results show that as time progresses, the demands in technical requirements of the people in the workplaces have also increased. It is because of the information systems' advantages in the ease of use,

user-friendliness, promptness in the responses, and the availability of data to be retrieved, which leads to the efficiency in the use of the time of the course (Ozcan et al., 2016).

Table 20. The Descriptive Comparison of the Manual and Developed System.

VARIABLES		N	MEAN	STD. DEVIATION	INTERPRETATION
Manual	Usability	338	1.74	0.81	near useless
	Reliability	338	1.75	0.82	least reliable
	Performance Efficiency	338	1.74	0.83	least efficient
	Overall	338	1.74	0.75	
Developed System	Usability	338	3.83	0.30	So much useful
	Reliability	338	3.79	0.30	very reliable
	Performance Efficiency	338	3.78	0.31	very efficient
	Overall	338	3.80	0.23	

As shown in Table 20, the descriptive comparison between the manual and the SAMS shows a significant difference in the overall mean of both sectors.

The developed system gained a higher mean of 3.80 from the 338 total respondents than the manual system. The indicators such as usability gained the highest mean of 3.83 to show that it is "so much useful," followed by reliability, which gained a mean of 3.79 to show that it is "very reliable." Performance efficiency gained 3.78 to show that it is "very efficient."

Further, the results show that the manual system differs from SAMS, which gained a mean of 1.4 with a standard deviation of 0.75. The indicators – usability and performance efficiency both gained a mean of 1.74 to indicate "near useless" and "least efficient," and reliability gained a mean of 1.75 to indicate "least reliable."

4.2 Qualitative Results

The respondents described several advantages and disadvantages of the manual and developed systems via survey questionnaires across all types. The responses from selected participants were as follows:

Table 21. The Qualitative Responses from Selected Respondents.

Participant No.	Manual System		Developed System	
	Advantage	Disadvantages	Advantage	Disadvantages
1	Traditional and easy to use	Tiring and time-consuming	Quick and easy to consolidate	The payment for web hosting every month

2	No need to call the learners one by one	Error-prone and vulnerable to falsifications	High tech	It cannot be used without the Internet.
3	Increases social interaction between the learners and teachers	Students can be marked as absent if not listening	Can offer real-time report generating	Some teachers are not well-oriented with technology
4	Too familiar to everyone	May consume the time for discussion	Consolidated information can be viewed in graphs in real-time	It cannot be used without electricity if the laptop's battery drains.
5	Can quickly be done with minimal resources (pen and paper)	The process is laborious	It disciplines students to bring their IDs daily	Might cause traffic, and students may flock to the gate
6	No maintenance	Some skip the process of attendance checking because it consumes much time	The manual workload of the curriculum head will be reduced	Needs technical maintenance
7	No traffic	Redundancy of routines	No need to go room to room to collect attendance	Students will be marked absent if they leave their IDs at home
8	Everybody knows the process	Decreases productivity	Can easily be monitored by the school principal	May experience system time out
9	Simple	The record can be lost	Data are safe and cannot be falsified	The school cannot use the system if the monthly web hosting fee is unpaid.
10	Teachers can see the actual face of the learners	It can give teachers a soar throat	The login process is very fast if the internet connection is high-speed	With no internet connection, the system won't function

REFERENCES

1. Agrawal, A., & Bansal, A. (2013). Online Attendance Management System Using RFID with Object Counter. International Journal on Information and Computation Technology, 3(3), 131-138.
2. Alharbi, A. (2015, May 19). A descriptive-evaluative study of a Saudi EFL textbook series. (K. Gritter, Ed.) 2(1). doi:https://doi.org/10.1080/2331186X.2015.1079946.
3. Baviskar, S. V., & Dighe, D. (2017). RFID-Based Attendance System. 3(5).
4. Bhise, A., Khichi, R., Korde, A., & Lokare, D. (2015). Attendance System Using NFC Technology with Embedded Camera on Mobile Device. International Journal of Advance Research in Computer and Communication Engineering, 4(2). doi:10.17148/IJARCCE.2015.4279.
5. Briones, L. (2021). Interim Guidelines on the Preparation, Submission, and Checking of School Forms for the School Year 2020-2021. Department of Education.
6. Briones, L. M. (2019). Policy Guidelines on the K to 12 Basic Education Program. Department of Education.
7. Bydrec. (2019). Retrieved from Bydrec, Inc: https://blog.bydrec.com/author/bydrec-inc/page/19.
8. Chiagozie, O., & Nwaji, O. (2012). RADIO FREQUENCY IDENTIFICATION (RFID) BASED ATTENDANCE SYSTEM WITH AUTOMATIC DOOR UNIT. Academic Research International, 17.
9. De Jesus, E. C. (2003). Reiteration to DECS Order Nos. 70 s.1999 and 2000. Pasig City: Department of Education.
10. Dixon, J., & Abuzneid, A.-s. (2020). An NFC-Based Student Attendance Tracking / Monitoring System Using an IoT Approach. 2020 International Conference on Computational Science and Computational Intelligence (GSCI). doi:10.1109/CSCI51800.2020.00201.
11. Hugh. (2001). Computer Safety, Reliability, and Security. Retrieved from EduFixer: https://edufixers.com/computer-safety-reliability-and-security/.
12. Iio, J. (2016). Attendance Management System using a Mobile Device and a Web Application. 2016 19th international conference on network-based information Systems (NBiS) (pp. 510-515). Tokyo: IEEE.
13. Jackson, K. (2018). Student Attendance Management System. International Journal of Engineering and Technology, 18. doi:10.21276/sjet.2018.6.2.1.
14. Khalid, N. (2017, September). Effects of Absenteeism on Students Performance. Retrieved from http://www.ijsrp.org: http://www.ijsrp.org/research-paper-0917/ijsrp-p6922.pdf.
15. Kommey, B., Anyane-Lah, O., & Amuzu, W. E. (2018). SwyftTapp: An NFC-based attendance system using fingerprint, 23-39. doi:DOI: http://dx.doi.org/10.4314/ijest.v10i1.3.
16. Kommey, B., Anyane-Lah, O., & Amuzu, W. E. (2018). SwyftTapp: An NFC Based Attendance System Using Fingerprint Authentication, 23-29.
17. Lahiri, S. (2005). RFID Sourcebook. In S. Lahiri, RFID Sourcebook (p. 276). IBM Pr; 1st edition (September 10, 2005).
18. Lawton, G. (2018). Mobile Application Strategy. Retrieved from Mobile Computing:https://www.techtarget.com/searchmobilecomputing/definition/Near-Field-Communication.
19. Lim, A. (2021, September 26). Educational Technology: How Important Is It In Today's Education Industry? Retrieved from https://elearningindustry.com/: https://elearningindustry.com/how-important-is-technology-in-todays-education-industry.

20. Mitra, A. R. (2017, December). publications. Retrieved from https://www.researchgate.net: https://www.researchgate.net/publication/321638555_Automated_Student_Attendance_Management_System_Using_Multiple_Facial_Images Nainan, S., Parekh, R., & Shah, T. (n.d.).
21. Ratheeswari, K. (2018). Information Communication Technology in Education. Journal of Applied and Advanced Research, 47.
22. Richey, R., Klien, J., & Nelson, W. (2023). Developmental Research: Studies of Instructional Design and Development. American Psychological Association.
23. Thein, M. M. (2015). Students' Attendance Management System Based on RFID and Fingerprint Reader. International Journal of Scientific & Technology Research, 8.
24. Thorndike, E. L. (1999). Educational Psychology. Psychology Press.
25. Tworek, K., & Liu, S. (2018, September 17). Reliability of information systems in organization in the context of banking sector:
26. Empirical study from Poland. (S. Liu, Ed.) Cogent Busine and Management. doi: https://doi.org/10.1080/23311975.2018.1522752.
27. Tardi, C. (2022, December 13). Other Technologies. Retrieved from Investopedia: https://www.investopedia.com/terms/n/near-field-communication-nfc.asp.
28. ISO 25000. (n.d.). Retrieved from https://iso25000.com/: https://iso25000.com/index.php/en/iso-25000-standards/iso-25010.

White Papers

1. Ovaska, S. (1991). "USABILITY AS A GOAL FOR THE DESIGN OF COMPUTER SYSTEMS. " Scandinavian Journal of Information Systems, 3(1). Retrieved from https://aisel.aisnet.org/sjis/vol3/iss1/4.
2. Ozcan, C., Saray, F., Ilhan, I., & Mustafa, T. (2016). Student Attendance System Application with NFC Label in Mobile Device. Proceedings of 2nd International Conference on Networking and Computer Application. Bangkok: ResearchGate.
3. Rjeib, H., Ali, N., Farawn , A., & Al-Sadawi, B. (2018). Attendance and Information System Using RFID and Web-Based Application for Academic Sector. (IJACSA) International Journal of Advanced Computer Science and Applications, *9*. doi: DOI:10.14569/IJACSA.2018.090137