



# Student Attendance Application For Class X Using Qr Code To Improve Student Order

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## ABSTRAK

Pemanfaatan aplikasi absensi online dan QR Code berbasis Android merupakan salah satu metode yang dapat diterapkan untuk mengatasi permasalahan tersebut dan berkontribusi pada proses absensi yang baik dan peringkasan yang mudah. Tujuan dari penelitian ini adalah menghasilkan aplikasi absensi menggunakan QR Code yang layak dan praktis. Penelitian ini termasuk ke dalam penelitian Research and Development (RnD) dengan menggunakan model MDLC (Multimedia Life Circle). Metode pengumpulan data yang digunakan adalah wawancara, observasi dan kuesioner dengan instrumen berupa lembar kuesioner. Metode analisis data yang digunakan adalah deskriptif dan kuantitatif. Hasil dari penelitian menunjukkan bahwa Aplikasi Absensi QR Code menyederhanakan proses absensi, meminimalkan kesalahan manual, dan meningkatkan efisiensi, sehingga dapat disimpulkan bahwa, Aplikasi Absensi QR Code sangat layak digunakan dan berpengaruh untuk diterapkan sebagai presensi siswa. Implikasi dari penelitian ini adalah perlunya sekolah untuk mulai beralih ke teknologi digital guna meningkatkan efisiensi administrasi. Implementasi aplikasi ini juga membuka peluang untuk integrasi data absensi dengan sistem lain, seperti sistem penilaian atau laporan kehadiran siswa.

## ABSTRACT

Utilizing online attendance applications and Android-based QR codes is one method that can be applied to overcome these problems and contribute to a good attendance process and easy summarization. The purpose of this research is to produce a feasible and practical attendance application using QR codes. This research is included in Research and Development (RnD) research using the MDLC (Multimedia Life Circle) model. The data collection methods used are interviews, observations and questionnaires with instruments in the form of questionnaire sheets. The data analysis method used is descriptive and quantitative. The study results show that the QR Code Attendance Application simplifies attendance, minimizes manual errors, and increases efficiency. Hence, the QR Code Attendance Application is feasible and influential in applying to student attendance. This research implies the need for schools to switch to digital technology to improve administrative efficiency. Implementing this application also opens up opportunities for integrating attendance data with other systems, such as the assessment system or student attendance reports.

## 1. INTRODUCTION

The increasingly advanced and rapid development of technology affects the comfort of people's lives, especially in the field of telecommunications (Aritonang, 2024; Kurniawatik et al., 2021). Smartphones, one of the technological developments in the field of telecommunications, offer many advantages and various types of applications that can be used for free (Haq, 2021; Nurningtyas & Ayriza, 2022; Pahlawan & Prabowo, 2020). Smartphones are now one of the technologies that can be used by many people as a means of communication and their development has progressed very rapidly. QR Code is the result of the development of smartphone technology. QR Code is a two-dimensional matrix (barcode) that is quickly read and has a large character storage capacity. QR Code is currently used in the world of education to determine the level of student attendance during face-to-face learning. In the current era of smartphone technology, Android records billions of active users every month. Android is an operating system for mobile phones based on Linux as its kernel. The Android operating system makes applications in the form of software or applications. This proves that the presence of the Android operating system in the world of smartphones makes mobile phones an inseparable part of human life (Abdul Muis Mappalotteng et al., 2023; Gunawan et al., 2023). The use of online attendance applications and Android-based QR Codes is one method that can be applied to overcome these problems and contribute to a good attendance process and easy summary (Abdul Fatah et al., 2021; Agus Kurniasari et al., 2023;

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[Atmakusuma et al., 2022a](#)). School users and teachers no longer need to summarize the attendance of all students, but can now obtain attendance summary results directly or in real time, so that students can quickly identify students who are often absent from school for further detection. However, the reality shows that many schools and educational institutions still use manual or semi-digital attendance systems, which are prone to errors, data manipulation, and time-consuming processing and reporting. Observations in several institutions show that this manual record-keeping often causes delays in reporting and difficulties in monitoring students who are repeatedly absent. Previous research also revealed that manual attendance systems tend to be inefficient compared to technology-based systems such as QR codes and smartphones ([Mishra et al., 2021](#)).

To address the challenges in attendance management, this research developed the design of a prototype application called TracKampus, aimed at assisting universities and lecturers in managing student attendance records. The application offers real-time student location tracking, not only by identifying the longitude and latitude coordinates but also by incorporating altitude data, ensuring more precise location information. Additionally, TracKampus features a QR code scanning system placed at the entrance of each classroom. Once students scan the QR code, their attendance is immediately recorded in the database, streamlining the process and ensuring data accuracy ([Astuti et al., 2021](#); [Christina et al., 2019](#); [Shah & Abuzneid, 2019](#)). This study presents the development of an online attendance system for students that integrates QR Code technology and Broadcast Short Message Service (SMS). The system was developed following the phases of the Waterfall methodology, ensuring a structured and sequential approach. To assess its functionality and reliability, the system underwent performance evaluation through black-box testing ([Atmakusuma et al., 2022a](#); [Christina et al., 2019](#)). This research aims to address the identified issues by developing a web-based QR Code attendance information system integrated with a Firebase database. The system is designed following the Waterfall methodology, ensuring a structured and sequential development process.

This research refers to previous studies that integrate QR Code technology and cloud-based systems in attendance applications ([Christina et al., 2019](#); [Gunawan et al., 2023](#)). However, this research offers a novelty, namely for the student attendance system in the classroom by utilizing facial recognition technology. This face-based attendance system is developed by using the latest image recognition technology to detect student faces in the classroom and register attendance when the student's face matches the face data stored in the database. Through this solution, the research seeks to streamline attendance management and enhance data accuracy for more effective monitoring and reporting. This study aims to develop a web-based e-attendance application utilizing QR Code technology to enhance the efficiency and effectiveness of student attendance management and reporting ([Abdul Muis Mappalotteng et al., 2023](#); [Odewole & Kadel, 2020](#); [Wiriasto et al., 2020](#)). The application leverages QR Code scanning for attendance tracking, with smartphones serving as the scanning devices to facilitate real-time data collection. The proposed system comprises three key components: a module for generating QR Codes by inputting student data, an application to capture attendance records, and a feature for generating attendance reports in CSV or XLS formats. Instructors verify student attendance by scanning the corresponding QR Code assigned to each student ([Atmakusuma et al., 2022b](#); [Hu & Li, 2020](#); [Sherly Christina et al., 2019](#)). The primary objective of this study is to design a QR Code Attendance System to enhance the efficiency of traditional manual attendance processes. The system also integrates a Global Positioning System (GPS) to track the students' locations in real-time using a QR Code scanner ([Casunuran et al., 2020](#); [Mishra et al., 2021](#)). The mobile application requires a basic internet connection and operates using QR Code-based technology as a mechanism for remotely registering attendance through a web portal. This system is designed to support field officers interacting with their respective clients. The proposed system also provides a high-level implementation framework to ensure seamless functionality. The QR Code-based attendance system utilizes a generated QR Code that is displayed for students to scan using a QR Code Reader.

## 2. METHOD

This study uses the Research and Development (R&D) development method to produce a feasible and practical product ([Harahap et al., 2022](#); [Marcela et al., 2022](#); [Murti et al., 2023](#)). The development model applied is the Multimedia Development Life Cycle (MDLC) with a waterfall approach, which includes the stages of conceptualization, design, material collection, assembly, testing, and distribution ([Angga Buana et al., 2024](#); [Mustika et al., 2018](#); [Setiawan et al., 2024](#)). This method was chosen due to its sequential and systematic nature, ensuring each stage of software development is structured before proceeding to the next stage. This study involved three expert validators, two information technology lecturers, and one informatics teacher in the product validation process. In

addition, three teachers at MAN 1 Brebes class X were used as test subjects for the QR Code attendance application. The trial was conducted in three sessions to measure the application's practicality and ease of use. Data were collected through observations, interviews, and questionnaires. Observations were made to identify initial problems in the manual attendance system. Unstructured interviews were used to explore user needs. Questionnaires were given to validators and users using a Likert scale to evaluate the product's feasibility and practicality. The instrument validity grids include expert validation covering aspects of interface design, practicality, and feasibility of features and user responses, covering ease of use, time efficiency, and user satisfaction with the application. Data were analyzed descriptively and quantitatively. Expert validation was calculated using a Likert scale to determine product feasibility with valid, moderately valid, and invalid criteria. Respondents' questionnaire results were calculated as a percentage of the total score to assess the practicality of the application. In addition, product trials were evaluated based on comparing pre-test and post-test data to measure the effectiveness of the application in saving attendance time and improving process efficiency. The analysis results are presented in graphs and tables to illustrate the improvement in the quality of the attendance system.

### 3. RESULT AND DISCUSSION

#### Result

At this stage, a QR Code Attendance application was created using Kodular. With the aim of minimizing the time during attendance, automatic data storage in MAN 1 Brebes class X. This process is carried out by designing the system design using UML (Unified Modeling Language) diagrams which include: flowcharts, storyboards, use case diagrams, and activity diagrams. The flowchart display is presented in [Figure 1](#), the storyboard is presented in [Figure 2](#), the use case diagram is presented in [Figure 3](#), and the activity diagram is presented in [Figure 4](#).

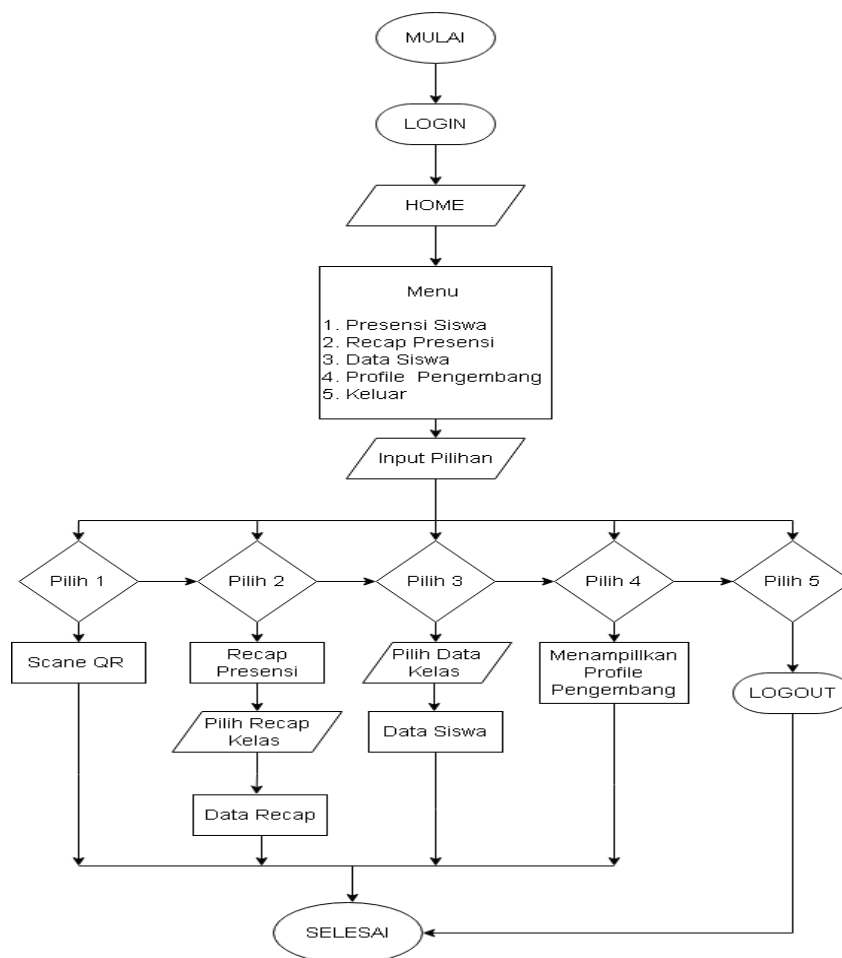


Figure 1. Flowchart

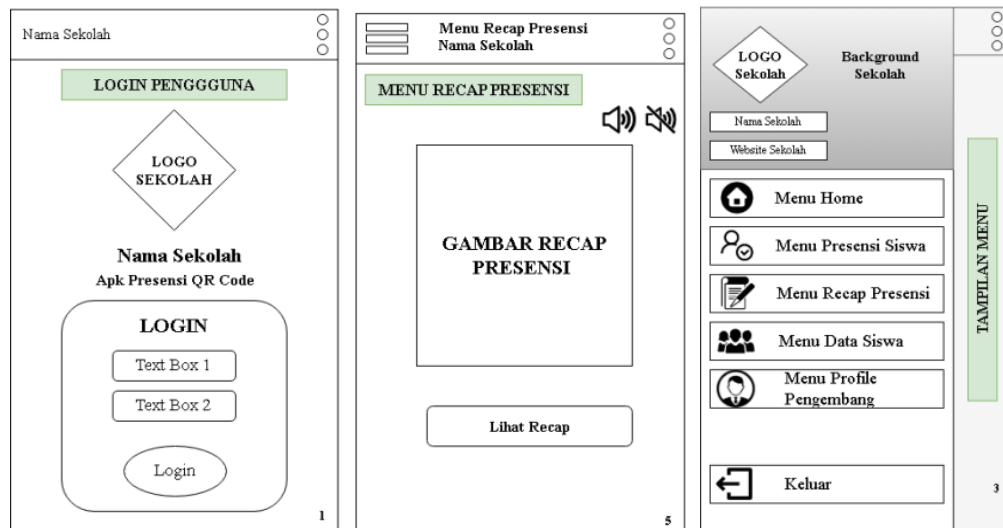


Figure 2. Storyboard

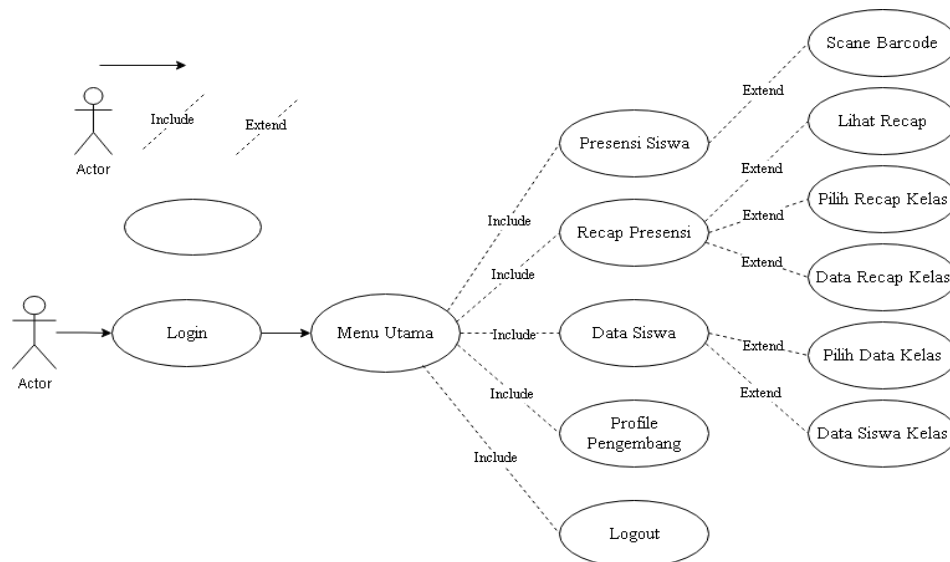


Figure 3. Use Case Diagram

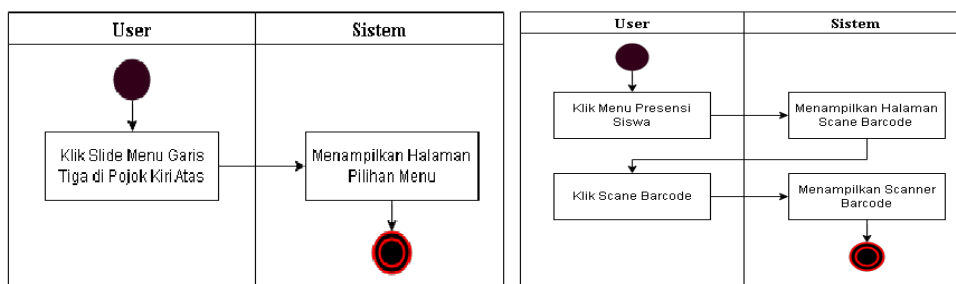


Figure 4. Activity Diagram

The material collecting stage is the stage where materials are collected based on application needs. Images, audio, and other materials are needed and can be obtained for free or by ordering from third parties. At this stage, the researcher collects various illustration images to support the QR Code Attendance Application that has been designed in CorelDraw X7, exported in.png format. This stage is the process of assembling all object materials that have been collected into an application. Application

creation is based on design stages such as flowcharts, storyboards, use case diagrams, and activity diagrams that have been created. The interface design creation stage is designed in Kodular and adjusted to the storyboard that has been created, at the material collecting stage all illustration image materials that have been collected are combined into one application. At this stage, researchers test the results of the application created using Kodular Companion. Kodular Companion helps researchers test applications directly on Android devices without having to download or install application files every time there is a change. By seeing the application running directly on the device, researchers can easily find and fix problems or bugs, see how the user interface and application display are made on real devices, and ensure that all application functions run correctly on various devices and configurations. After testing using Kodular Companion is complete by ensuring that each feature runs as expected and that the interaction between the user and the system runs smoothly, expert validation is carried out. Expert validation is carried out by two lecturers of Information Technology Education and One Informatics Teacher at MAN 1 Brebes.

The distribution stage is when the application is saved to the storage media. If the storage media is not enough to accommodate the application, it will be compressed in the application. At this stage, the QR Code Attendance Application will be distributed to MAN 1 Brebes as a supporting media for the student attendance process. A preliminary study is the first stage carried out in this educational game research. A preliminary study can also be used in making research references. The results of the preliminary study of the research determine the MDLC model as a product development model for the QR Code Attendance Application. The results of the study are said to be successful if the QR Code Attendance application is said to be feasible, practical and to replace manual attendance. the results of the study can be seen from the expert validation questionnaire, respondent questionnaire, post-test and pre-test questionnaires. Based on the results of observations and unstructured interviews with teachers at MAN 1 Brebes, it was found that the attendance of class X at MAN 1 Brebes school still uses a manual handwritten attendance system, and also the attendance at MAN 1 Brebes school every time a subject changes must be absent again where dozens of students must be called one by one so that it takes quite a long time. The use of QR Code attendance in the attendance process for these students is still not optimal because the attendance system that the researcher created for the whole is not for each subject that changes, so a QR Code attendance system is needed for each subject. The product produced by the researcher is the QR Code Attendance Application for MAN 1 Brebes Class X students. The design of the QR Code Attendance Application presented in Figure 5.

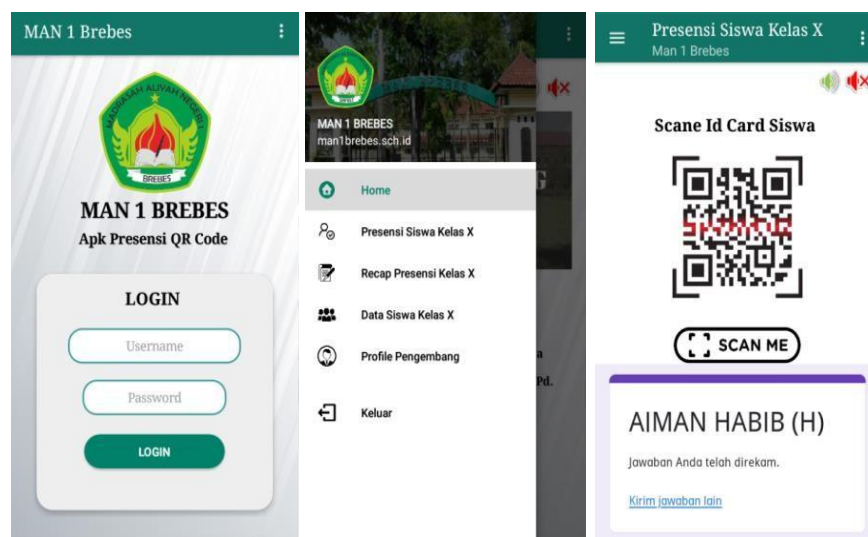


Figure 5. Result Design

The QR Code Presence Application that has been completed will be tested for its feasibility with an expert validation test. In this expert validation test there are three validators, namely two information technology lecturer validators and one Informatics teacher at MAN 1 Brebes. Expert Validation is done by filling out a questionnaire, then from the data obtained, a calculation analysis is carried out using a Likert scale. Validity testing by expert validators using a checklist instrument (v) using a Likert scale. The result validator is presented in Table 1.



**Tabel 1. Result Validator**

No	Aspect	Total Score	Ideal Score	Percentage	Eligibility
1.	General Aspects	15	20	75%	Worthy
2.	Application Content Eligibility Aspects	16	20	80%	Very Worth It
3.	Application Usage Aspects	16	2	80%	Very Worth It
<b>Jumlah</b>		<b>47</b>	<b>60</b>		

At this stage, the application has been revised and then tested on MAN 1 Brebes teachers, with a total of 3 meetings and 3 teachers using the QR Code attendance application for teacher respondents. The implementation of the application trial for teachers was carried out by filling out the respondent questionnaire provided by the researcher and the application was sent via WhatsApp. Furthermore, teachers can first download the application that has been sent and teachers start installing it on their respective smartphones. Data obtained from respondent questionnaires using the Likert Scale. The Likert Scale measures the variables to be measured as indicator variables. The result respondent is presented in Table 2.

**Table 2. Result Respponent**

Responden	Skor			Total
	General Aspects	Application Usage Aspects	Application Usage Aspects	
Responden 1	16	18	18	52
Responden 2	16	17	18	51
Responden 3	18	17	18	53

**Discussion**

QR Code Attendance Application to improve teaching students who are eligible, this aims the purpose of the development research is to produce a product through a testing or verification process to produce a feasible and practical product. QR Code Attendance Application as a fast device in conducting student attendance at MAN 1 Brebes, especially class X. In this study, the researcher used the Research and Development method because this study aims to develop a QR Code attendance application. To obtain maximum product results, the researcher used the Multimedia Development Life Circle model which consists of six stages, namely concept, design, material collection, assembly, testing, and distribution. The first stage is the concept Based on the researcher conducting observations and unstructured interviews with teachers of MAN 1 Brebes at MAN 1 Brebes. Based on the observations and interviews, the researcher found a problem, namely manual attendance is prone to fraud, spends more time to recap data, manual recording often causes errors, is inefficient in the administration process and slows down the attendance process. Therefore, the researcher determined the needs analysis, namely the need for modern attendance using QR Code. The second stage is design, design includes the creation of program architecture, style, appearance, and material requirements or process materials that occur at this stage, namely designing flowcharts, storyboards, use case diagrams, and activity diagrams. The third stage is material collecting. Based on the researcher collecting all student identity data needed to make products such as attendance books and student data books. The fourth stage is assembly (making) based on the researcher's process of compiling all the collected object materials, writing the student's name, making a barcode, and making a valid attendance recap into an application. In the process of making the application, supporting hardware and software are needed. Software requirements include Windows 10 pro, CorelDRAW X7, Kodular, Android SDK, Google Spreadsheet and hardware requirements include AMD E1 - 1200 APU Laptop, 4.00 GB 64 bit memory and Android Smartphone. The creation of this application is based on the design stages such as flowcharts, storyboards, use case diagrams, and activity diagrams that have been made. This is supported by researchers. The fifth stage is testing, this testing stage is carried out by expert validators and respondents. The expert validation test was carried out by three expert validators, namely, Mrs. Ika Menarianti, S.Kom., M.Kom., Mr. Ade Ricky Rozzaki, S.Pd., M.Kom., as a Lecturer in Digital Business and Information Technology Education Study Program and Mr. Eko Pujiyanto, S.E, M.Kom., as an Informatics teacher at MAN 1 Brebes. The assessment by expert validation obtained the following average percentage is presented in Table 3.

**Table 3. Overall Results Validator**

No	Expert Validation	Assessment Results	Criteria
1.	Validator 1	78%	Very Worth It
2.	Validator 2	78%	Very Worth It
3.	Validator 3	95%	Very Worth It
<b>Average Percentage</b>		<b>84%</b>	<b>Very Worth It</b>

Based on the results of expert validation, it can be concluded that validator 1 with an average percentage of 78% is included in the "Very Eligible" criteria, validator 2 with an average percentage of 78% is included in the "Very Eligible" criteria and validator 3 with an average percentage of 95% is included in the "Very Eligible" criteria. Then for the overall results of expert validation, it can be concluded that the average percentage of 84% is included in the "Very Eligible" criteria for us. After the validation test by the expert validator, the results of the respondent test questionnaire filled out by three MAN 1 Brebes teacher respondents were calculated. Which respondent questionnaires obtained an average is presented in Table 4.

**Tabel 4. Overall Results Responden**

No	Responden	Assessment Results	Criteria
1.	Responden 1	86%	Very Worth It
2.	Responden 2	85%	Very Worth It
3.	Responden 3	88%	Very Worth It
<b>Average Percentage</b>		<b>86%</b>	<b>Very Worth It</b>

Based on the results of the calculation of the teacher respondent questionnaire filled out by 3 class X 1 teachers of MAN 1 Brebes, the percentage was 86%, including the criteria of "Very Suitable" for use. The sixth stage is distribution. At this stage, the application is saved in .apk format. Then the QR Code Attendance Application is distributed to teachers at MAN 1 Brebes as a supporting medium for the attendance process. Furthermore, the attendance data before using the QR Code attendance application in July after being calculated using a percentage for one month in class X 1, which was 93% and the August data after using the QR Code attendance application for three days of testing, which was 100%, it can be concluded that before and after using the QR Code Attendance Application there was an increase of 2%. Based on the research conducted, it can be concluded that this QR Code Attendance application is valid, practical and very feasible to be used for modern attendance using QR Code. Thus, the QR Code Attendance Application can be applied and used as an attendance media to support the student attendance process at MAN 1 Brebes.

The strength of this research is the systematic application of the Multimedia Development Life Cycle (MDLC) model, from needs analysis to product distribution, resulting in a valid and relevant application to user needs (Army Trilidia Devega, 2022; Juhardi & Widiyanto, 2024). In addition, involving expert validators with appropriate backgrounds and respondents who are educational practitioners increases the validity of the research results. The results of this study are significant for the world of education, especially in supporting the digitalization of school management (Dwinanto & Ahmad, 2024; Saputra & Dristyan, 2024). The QR Code Attendance Application can be an example of simple technology development that significantly impacts the efficiency and transparency of the attendance process. In addition, this application could become a model for similar development in other schools. This research implores schools to start shifting to digital technology to improve administrative efficiency. Implementing this application also opens up opportunities for integrating attendance data with other systems, such as the assessment system or student attendance reports. However, this research has some limitations. Testing was conducted on a limited scale in one school, so it must reflect variations in other user contexts. In addition, this application only focuses on student attendance and has not integrated other features such as schedule management or automated reports. For future research, it is recommended to test this application in various types of schools on a broader scale and develop additional features that support the needs of school management as a whole.

#### 4. CONCLUSION

Based on the research and discussion, the QR Code Attendance Application meets the established criteria and offers an effective solution for modernizing attendance systems. This study employed the

Research and Development (R&D) method, following the Multimedia Development Life Cycle model, which consists of six phases: concept, design, material collection, assembly, testing, and distribution. The application has been validated with high feasibility, receiving positive responses from teachers, confirming its practicality and relevance. As a result, the QR Code Attendance Application streamlines the attendance process, minimizes manual errors, and improves efficiency, making it well-suited for implementation in educational institutions.

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