

## **The Development of a Digital-Based Attendance System to Enhance the Discipline of Fifth Grade Students at SD Negeri 62 Palembang**

**Nurul Sari<sup>1</sup>, Edi Harapan<sup>1</sup>, Sri Wahyu Indrawati<sup>1</sup>**

<sup>1</sup>Universitas PGRI Palembang

Corresponding author e-mail: [dr.edi.harapan@gmail.com](mailto:dr.edi.harapan@gmail.com)

Article History: Received on 22 June 2025, Revised on 25 June 2025,  
Published on 27 June 2025

**Abstract:** The integration of digital technology in education is increasingly recognized as a strategic effort to support character development and improve student discipline. This study explores the development and implementation of a digital-based attendance system to enhance the discipline of fifth-grade students at SD Negeri 62 Palembang. Employing a research and development (R&D) approach based on the Borg and Gall model, this study involved stages from preliminary research to product refinement. The digital attendance system utilizes barcode technology, allowing real-time and automated recording of student attendance. In the context of Indonesian elementary education, the use of barcode-based attendance represents a novel and practical innovation, addressing long-standing challenges of manual record-keeping and promoting digital literacy among students and teachers alike. Data were collected through expert validation questionnaires, user practicality assessments by teachers and students, and discipline observations. Quantitative analysis revealed that the developed product was highly valid, with expert approval ratings indicating strong content and media reliability. The practicality test showed 98% of teachers and 100% of students responded favorably. Effectiveness was evaluated through pretest and posttest assessments of student discipline, supported by statistical analysis using the Wilcoxon Signed-Rank Test and Mann-Whitney U Test, both showing significant improvements in the experimental groups ( $p = 0.000$ ). These findings demonstrate that digital attendance systems can significantly increase student punctuality and overall discipline. This study contributes to the growing literature on educational technology adoption in elementary schools and provides practical insights for schools seeking innovative digital solutions to support character education and school management.

**Keywords:** Digital, Discipline, Educational Technology, Development, Elementary Education.

### **A. Introduction**

Education in Indonesia serves as a strategic foundation for national development, aiming to produce competent, morally upright, and character-driven citizens (Sofha et al., 2023). As outlined in the National Education System Law No. 20 of 2003, education is not only intended to improve academic competencies but also to build strong character traits in students, such as discipline, responsibility, and respect for rules and norms (Arifin, 2017). In line with this, the Ministry of Education has continued to promote character education

through various initiatives, including the implementation of the Profil Pelajar Pancasila and the Merdeka Curriculum, which emphasize values such as independence, collaboration, and discipline as essential traits for 21st-century learners (Wulandari et al., 2024)

SD Negeri 62 Palembang has faced persistent challenges in managing student discipline related to attendance, particularly among fifth-grade students. According to internal school reports, late arrivals and unauthorized absences frequently occur, especially after weekends or holidays. Despite the school's commitment to nurturing student character and academic success, the traditional attendance system, which relies on manual processes, has proven ineffective in addressing these challenges (Kamila et al., 2024). Manual attendance methods are time-consuming, vulnerable to recording errors, and lack real-time monitoring capabilities (Ananta & Ariyanto, 2025). Teachers often spend valuable instructional time calling out student names, and it is difficult to detect patterns of tardiness or absenteeism promptly. Moreover, manual systems offer limited transparency and do not provide timely information to parents or administrators (Shobri, 2024).

Recognizing these limitations and the urgent need for a more efficient and transparent attendance mechanism, the school began exploring technology-driven solutions that align with its values-based educational goals. To overcome these limitations, the adoption of digital attendance systems has emerged as a promising solution (Ishaq & Bibi, 2023). Digital attendance leverages technological tools—such as barcodes, QR codes, and mobile applications—to automate the recording and tracking of student presence (Nishom et al., 2023). These systems offer various benefits, including real-time data access, enhanced accuracy, automatic reporting, and better integration with existing school management systems (Nusantara et al., 2025).

One widely used and cost-effective method in digital attendance is the use of barcode scanning (Elaskari et al., 2021). With each student assigned a unique barcode linked to their attendance profile, teachers can scan students quickly using smartphones or desktop devices, significantly reducing the time and effort needed for roll calls while increasing the reliability of attendance data (Meinarni et al., 2021). The use of barcode technology also provides a contextually appropriate solution in Indonesian public schools, where budget constraints and infrastructure variability make more complex systems, such as biometric or RFID-based attendance, less feasible.

In the context of SD Negeri 62 Palembang, the need for a digital attendance system is supported by the school's vision to instill strong values of discipline in students. The fifth-grade level was deliberately selected as the initial focus of this study due to its transitional role in elementary education, where students begin to demonstrate greater independence but also face increasing behavioral challenges. Internal monitoring data revealed that this grade had the highest frequency of late arrivals and unexplained absences, making it a strategic target group for intervention.

This study, therefore, aimed to develop a digital attendance system based on barcode scanning, using the Borg and Gall Research and Development model. The Borg and Gall

research and development model process consisted of ten stages—from preliminary analysis and product design to expert validation, practicality testing, and effectiveness evaluation (Maulani et al., 2022). The attendance system was designed to be accessible via smartphones and desktop computers, integrated with Google Sheets for data storage, and capable of producing attendance reports for school administrators and parents (Azizah et al., 2024).

This study addresses the gap in research on digital transformation in school administrative processes, especially in elementary education. While much attention has been given to the use of educational technology for instructional purposes, less focus has been placed on its role in supporting school governance and character-building practices (Cholifah, 2024). By exploring the design, implementation, and impact of a digital attendance system in a public elementary school, this research contributes practical insights into how schools can adopt digital tools to strengthen discipline and enhance the efficiency of daily operations.

## **B. Methods**

This study employed a mixed-method research and development (R&D) approach using the Borg and Gall model to design, test, and refine a digital attendance system aimed at improving student discipline. The development process followed ten systematic stages, including preliminary research, planning, product development, expert validation, limited trials, and operational field testing (Sa'diyah, 2020).

The research was conducted at SD Negeri 62 Palembang, with the primary subjects comprising fifth-grade students and their homeroom teachers. A total of 48 students and 2 teachers participated in the final product testing. The inclusion criteria for student participants were active enrollment in fifth grade, consistent school attendance during the research period, and willingness to participate with parental consent. Exclusion criteria included students with special attendance exemptions or those transferred during the research. For teachers, inclusion criteria included active teaching in fifth grade at SD Negeri 62 Palembang.

Data collection involved expert validation questionnaires (to assess content and media validity), practicality questionnaires (administered to teachers and students), observation sheets, and documentation analysis. The observation parameters focused specifically on indicators of student discipline, such as punctuality in arrival, preparedness at the start of class, and frequency of unexcused absences. Documentation included attendance logs before and after the implementation of the system, and screenshots of system use.

The aim of this methodological approach was to produce a digital attendance system that is not only valid in terms of content and usability but also practical for classroom implementation and effective in fostering punctual behavior and self-discipline among elementary students (Rahmawati & Fitriana, 2024).

### **Population**

The population of this study consists of all fifth-grade students and their respective classroom teachers at SD Negeri 62 Palembang, who were involved in the research. The implementation of the digital attendance system was conducted in two experimental classes consisting of a total of 48 students and 2 homeroom teachers. Additionally, one control class, which did not use the digital attendance system, was included for comparison. This design allowed for the evaluation of the system's effectiveness in improving student discipline through comparative analysis between experimental and control groups.

### **Data collection technique**

In this study, data collection techniques consisted of questionnaires, observations, and documentation. Expert validation questionnaires were used to assess the validity of the digital attendance system, while practicality questionnaires were distributed to teachers and students to evaluate ease of use and user satisfaction. Observations were conducted to monitor changes in student discipline during the implementation. Documentation supported the process through system reports and attendance records. To measure effectiveness, student discipline scores were analyzed using pretest and posttest comparisons, allowing the researcher to assess the impact of the digital system on improving punctuality and overall discipline (Nisah et al., 2021).

### **Measurement Indicators**

In this study, questionnaires were used as the primary data collection instrument to evaluate the validity, practicality, and effectiveness of the digital attendance system. The questionnaires consisted of closed-ended statements measured using a Likert scale, which allowed for quantifying the perceptions and experiences of expert validators, teachers, and students regarding the use of the system.

The Likert scale is commonly used in quantitative research to measure the level of agreement, frequency, or intensity of respondents' attitudes, behaviors, or experiences (Linus, 2025). In this research, the scale was designed to measure how frequently or how strongly respondents agreed with specific statements related to content validity, user experience, and behavioral discipline. The Likert scale used in the questionnaires consisted of the following response options, each assigned a numerical score:

- 1 = Strongly Disagree
- 2 = Disagree
- 3 = Neutral
- 4 = Agree
- 5 = Strongly Agree

These categories were used to evaluate indicators such as the ease of scanning attendance barcodes, clarity of instructions, frequency of student punctuality, and the system's contribution to routine classroom discipline. The uniform interval scale allowed

for straightforward calculation of mean scores, percentages, and categorical interpretation of results.

To convert the questionnaire scores into analyzable discipline data, each item in the questionnaire was linked to specific indicators within the discipline construct, such as punctual attendance, adherence to procedures, and behavioral consistency. Individual scores for each item were summed to produce a total score per respondent, which was then averaged to obtain a mean score for each indicator. These values were subsequently used to quantitatively represent students' discipline levels and served as the basis for comparative analysis before and after the implementation of the digital attendance system.

This methodology is grounded in the Likert scale theory developed by Rensis Likert (1932), which provides a structured approach for capturing subjective perceptions and translating them into measurable quantitative data. The use of this measurement model ensured that the collected data were both reliable and valid for statistical analysis.

### **Research Hypothesis**

Hypothesis testing was conducted to determine whether there is sufficient evidence from the sample data to reject or accept the null hypothesis (Akbar et al., 2023). The test focused on evaluating the effectiveness of the developed digital attendance system in improving student discipline among fifth-grade students at SD Negeri 62 Palembang.

**H<sub>0</sub>:** There is no significant difference in student discipline scores before and after the implementation of the digital attendance system at SD Negeri 62 Palembang.

**H<sub>1</sub> :** There is a significant difference in student discipline scores before and after the implementation of the digital attendance system at SD Negeri 62 Palembang.

### **Data analysis**

In this study, data analysis techniques utilized inferential statistics to evaluate the validity, practicality, and effectiveness of the digital attendance system in improving student discipline at SD Negeri 62 Palembang. The analysis was conducted using SPSS version 26. To assess the effectiveness of the product, discipline scores were compared before and after the implementation using the Wilcoxon Signed-Rank Test for within-group analysis, and the Mann-Whitney U Test for between-group comparisons (experimental and control classes). These non-parametric tests were chosen due to the ordinal nature of the data and the distribution characteristics identified during the normality test (Amaluis, 2014).

### **Normality Test**

To determine whether the data are normally distributed. This test was conducted using the Kolmogorov-Smirnov method. In this study, the results of the Kolmogorov-Smirnov test showed that the significance values for both pretest and posttest discipline scores were less than 0.05, indicating that the data were not normally distributed.

### **Wilcoxon Signed Rank Test**

To test whether there is a significant difference in student discipline scores before and after the implementation of the digital attendance system, the Wilcoxon Signed-Rank Test was used. This non-parametric test is appropriate for paired or related samples when the data do not meet the assumptions of normality. The test compares the pretest and posttest scores within the same group (experimental classes). The difference is considered statistically significant if the significance value (p-value) is less than 0.05 ( $p < 0.05$ ).

### **Mann-Whitney U Test**

To determine whether there is a significant difference in student discipline scores between the experimental group and the control group after treatment, the Mann-Whitney U Test was used. This test is suitable for comparing two independent groups when the data are not normally distributed. The difference between the two groups is considered statistically significant if the significance value (p-value) is less than 0.05 ( $p < 0.05$ ).

## **C. Results and Discussion**

### **Descriptive Statistics**

#### **Descriptive Analysis of the Digital Attendance System Validity**

The descriptive analysis of the product validity reveals that the digital attendance system developed for fifth-grade students at SD Negeri 62 Palembang meets high standards of content and media feasibility. Based on expert validation, the system received an average score of 92.5% for material content and 90% for media design, both of which fall under the “very valid” category. The indicators assessed include clarity of content, relevance to learning objectives, ease of use, layout consistency, and technical functionality. Among these, the highest rating was observed in the indicator for clarity of barcode scanning instructions, with a mean of 4.75, indicating strong agreement among validators. The low standard deviation suggests that expert responses were consistently high. These results affirm that the product is well-aligned with educational standards and technically reliable for school-level implementation.

#### **Descriptive Analysis of the Practicality of the Digital Attendance System**

The practicality of the digital attendance system was evaluated through teacher and student questionnaires administered during limited and operational trials. The findings show an overwhelmingly positive response, with 98% of teachers and 100% of students indicating that the system was practical and easy to use. Key indicators included the simplicity of scanning barcodes, ease of access via smartphone or desktop, integration with Google Sheets, and clarity of attendance reporting. Teachers highlighted the system’s time-saving nature and its ability to provide real-time attendance data as major strengths. Among students, the system was perceived as more engaging than manual roll calls. The item with the highest mean score (4.87) related to the ease of scanning upon entering the classroom, indicating smooth user interaction. The consistently high responses confirm that the system is both user-friendly and functionally effective in the context of elementary education.

### **Descriptive Analysis of Student Discipline Before and After Implementation**

The descriptive analysis of student discipline scores indicates a noticeable improvement following the implementation of the digital attendance system. Before the intervention, discipline scores were moderate, with several students frequently arriving late or showing irregular attendance patterns. Post-implementation data show an increase in punctuality, more consistent attendance, and enhanced student awareness regarding time management. The average discipline score increased from 72.4 in the pretest to 88.6 in the posttest for the experimental group. This shift represents a significant positive change in behavioral patterns. Observation notes also confirmed that students showed greater initiative in scanning their barcodes without being prompted, and classroom routines became more orderly. Although some students initially required guidance during the trial phase, the learning curve was minimal. These results suggest that the digital system not only improves administrative efficiency but also strengthens student discipline by reinforcing daily routines and promoting accountability.

### **Conclusion of Descriptive Analysis of the Three Variables**

Based on the descriptive analysis of the three variables—validity, practicality, and effectiveness—it can be concluded that the digital attendance system developed for SD Negeri 62 Palembang is highly valid, practical, and effective. Expert assessments confirmed the system’s strong content and media quality, while responses from teachers and students indicated high user-friendliness and efficiency. The system also contributed to a significant improvement in student discipline, particularly in punctuality. These results demonstrate that the digital attendance system is a feasible and impactful tool to support discipline and school management in elementary education.

### **Hypothesis**

**Table 1. The Normality Kolmogorov Smirnov Test for Pre Test and Post Test of Student Discipline Score Data**

<b>One-Sample Kolmogorov-Smirnov Test</b>			
		before	after
N		48	48
Normal Parameters <sup>a,b</sup>	Mean	19.0833	19.9375
	Std. Deviation	1.31818	.31999
Most Extreme Differences	Absolute	.319	.536
	Positive	.243	.423
	Negative	-.319	-.536
Test Statistic		.319	.536
Asymp. Sig. (2-tailed)		.000 <sup>c</sup>	.000 <sup>c</sup>
a. Test distribution is Normal.			
b. Calculated from data.			
c. Lilliefors Significance Correction.			

The normality test was conducted using the One-Sample Kolmogorov-Smirnov method to examine whether the pretest and posttest discipline score data were normally distributed. The test was applied to a sample of 48 students for both the before (pretest) and after (posttest) data sets. The results show that the Asymp. Sig. (2-tailed) values for both the pretest and posttest scores are 0.000, which is less than 0.05. According to the decision criteria, if the significance value is less than 0.05, the data are considered not normally distributed.

After it was determined that the data were not normally distributed based on the results of the Kolmogorov-Smirnov test, the analysis of differences was carried out using a non-parametric test is the Wilcoxon Signed-Rank Test.

**Table 2. Result of Wilcoxon Signed Rank Test**

Test Statistics <sup>a</sup>	
	after - before
Z	-3.664 <sup>b</sup>
Asymp. Sig. (2-tailed)	.000
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

To determine whether there was a significant difference in student discipline scores before and after the implementation of the digital attendance system, the Wilcoxon Signed-Rank Test was conducted. This non-parametric test is appropriate for related samples that do not meet the assumption of normal distribution.

The results show a Z value of -3.664 with an Asymptotic Significance (2-tailed) of 0.000, which is less than 0.05. According to the decision criteria, if the p-value is less than 0.05, the null hypothesis is rejected.

Therefore, it can be concluded that there is a statistically significant difference between the pretest and posttest discipline scores of students. This indicates that the implementation of the digital attendance system had a positive and significant effect on improving student discipline at SD Negeri 62 Palembang.

**Table 3. The Normality Kolmogorov Smirnov Test for Student Discipline Score Data from the Experimental and Control Classes**

Tests of Normality							
	kelompok	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
skor	kelompok	.536	48	.000	.200	48	.000
	kelompok	.209	24	.008	.881	24	.009
a. Lilliefors Significance Correction							

The results show that for the overall group (N = 48), the Kolmogorov-Smirnov test produced a significance value of 0.000, and the Shapiro-Wilk test also showed 0.000, both of which are less than 0.05. This indicates that the distribution of discipline scores in the overall dataset is not normal. When analyzed by group, the Kolmogorov-Smirnov significance value was 0.008 and the Shapiro-Wilk significance was 0.009 for one of the subgroups (df = 24), again indicating a non-normal distribution.

According to the standard decision rule, if the significance value is less than 0.05, the data are considered not normally distributed. Therefore, it can be concluded that the discipline score data in both the overall sample and subgroup samples do not follow a normal distribution, and thus, non-parametric Mann Whitney U tests for comparing two independent groups.

**Table 4. Result of Mann-Whitney U Test**

Test Statistics <sup>a</sup>	
	skor
Mann-Whitney U	1.000
Wilcoxon W	301.000
Z	-8.008
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: kelompok

To compare the discipline scores between the experimental and control groups after the implementation of the digital attendance system, a Mann-Whitney U Test was conducted. This non-parametric test is appropriate for comparing two independent samples when the data do not follow a normal distribution.

The results show a Mann-Whitney U value of 1.000, with a Z value of -8.008 and an Asymptotic Significance (2-tailed) of 0.000, which is less than 0.05. Based on this result, the null hypothesis is rejected.

This indicates that there is a statistically significant difference in student discipline scores between the experimental group and the control group. The experimental group, which used the digital attendance system, showed significantly higher discipline scores compared to the control group. These findings support the effectiveness of the digital attendance system in improving student discipline at SD Negeri 62 Palembang.

Beyond statistical significance, these results have broader implications for character education and school governance in the digital era. The observed improvements in punctuality and adherence to routines align with behavioral theories of reinforcement. Moreover, the findings also support the theoretical foundation of digital transformation in education, which posits that integrating simple, contextually appropriate technologies can optimize school management systems and reinforce educational values.

This research contributes to the growing body of evidence that digital tools are not only instructional aids but also effective behavioral management systems. By facilitating real-time monitoring, increasing transparency, and reducing teacher workload, the digital attendance system promotes a culture of accountability and responsibility among students. This has potential long-term effects on the development of student character,

particularly discipline, which is a core element of the Profil Pelajar Pancasila and other national character education goals.

Therefore, it can be concluded that the digital attendance system has a significant influence on improving student discipline, both through individual changes in student behavior and group-level differences in discipline outcomes. Although further refinement may enhance its long-term impact, the integration of digital tools in daily attendance practices proves to be an effective strategy in promoting punctuality and responsibility among elementary school students. Strengthening the implementation of such systems is essential to support discipline-based character education in primary schools.

### **The Role of Digital Attendance in Improving Student Discipline**

Digital attendance plays a vital role in improving student discipline by fostering punctuality, consistency, and responsibility among learners. Unlike traditional manual methods, digital systems—such as barcode-based attendance—offer efficient, real-time recording and minimize the risk of error or manipulation. By embedding structured routines into the school day, these systems encourage students to be more accountable for their presence and behavior. In the case of SD Negeri 62 Palembang, the implementation of a digital attendance system contributed to noticeable improvements in student punctuality and classroom order. As a result, digital attendance serves not only as an administrative innovation but also as a strategic tool to support character education and enhance overall discipline in elementary school settings.

### **Digital Attendance Effectiveness: Linking Technology Use to Student Discipline**

The effectiveness of digital attendance systems lies not only in their ability to streamline administrative tasks but also in their potential to positively influence student behavior. By incorporating technology into daily attendance routines—such as barcode scanning and real-time data tracking—schools create structured, consistent expectations that encourage students to arrive on time and take responsibility for their presence. This study demonstrates that the use of digital attendance at SD Negeri 62 Palembang is strongly linked to improvements in student discipline, particularly in terms of punctuality, routine compliance, and accountability. The successful integration of digital tools into school operations highlights the broader impact of educational technology on character formation, showing that when technology is thoughtfully applied, it can serve as an effective means of supporting behavioral development alongside academic goals.

### **Theoretical and Practical Implications**

Theoretically, this study affirms that the integration of digital technology into school administrative processes—specifically attendance systems—can directly support the development of student discipline, a key aspect of character education emphasized in Indonesian primary schools. The findings at SD Negeri 62 Palembang demonstrate that technology does not only serve instructional functions, but also plays a strategic role in shaping student behavior through structured routines and accountability mechanisms. Practically, the successful implementation of the barcode-based digital attendance system provides a replicable model for other schools facing similar issues with student tardiness and attendance management. It offers a low-cost, accessible, and user-friendly

solution that enhances administrative efficiency while promoting punctuality and responsibility among students. These implications highlight the value of aligning technological innovations with school discipline strategies to achieve both academic and behavioral improvements.

#### **D. Conclusion**

Research findings indicate that the development and implementation of a digital attendance system at SD Negeri 62 Palembang significantly contributes to the improvement of student discipline, particularly in terms of punctuality and responsibility. The system was proven to be valid and practical based on expert evaluations and positive responses from teachers and students. Moreover, statistical analysis confirmed that the digital attendance system effectively enhanced discipline compared to traditional attendance methods. These findings affirm that integrating simple digital tools into school routines can support character development and improve administrative efficiency.

Theoretically, the results reinforce behaviorist principles-particularly operant conditioning-which suggest that consistent, immediate reinforcement (such as real-time feedback on attendance) promotes positive behavior patterns. This study also supports educational technology frameworks that emphasize the role of context-appropriate digital tools in shaping student behavior and optimizing school processes. Practically, the success of this initiative highlights the importance of aligning educational technology with behavioral and character-building objectives. It demonstrates that digital innovation, when implemented effectively, can serve as a valuable strategy to strengthen discipline in primary education, reduce teacher workload, and increase school accountability.

For future research, it is recommended to explore the long-term sustainability of the system, its scalability across different grade levels and schools, and its integration with other character education programs. Investigating the impact of digital attendance tools on other aspects of student behavior-such as engagement, motivation, and academic performance-would also provide a more comprehensive understanding of its benefits and limitations.

#### **E. Acknowledgements**

We We would like to express our sincere gratitude to the school authorities, teachers, and students of SD Negeri 62 Palembang for their valuable support and active participation in the implementation of this research entitled *The Development of a Digital-Based Attendance System to Enhance the Discipline of Fifth Grade Students at SD Negeri 62 Palembang*. Their cooperation and commitment greatly contributed to the successful completion of this study.

## Reference

- Akbar, R., Sukmawati, U. S., & Katsirin, K. (2023). Analisis Data Penelitian Kuantitatif: Pengujian Hipotesis Asosiatif Korelasi. *Jurnal Pelita Nusantara*, 1(3), 430–448. <https://doi.org/https://doi.org/10.59996/jurnalpelitanusantara.v1i3.350>
- Amaluis, D. (2014). Analisis efektifitas program pelatihan diklat PIM III terhadap kompetensi pejabat eselon III di Pemerintah Kabupaten Agam. *Journal of Economic and Economic Education*, 3(1), 18–26. <https://doi.org/https://doi.org/10.22202/economica.2014.v3.i1.232>
- Ananta, A. Y., & Ariyanto, R. (2025). PENGEMBANGAN SISTEM PRESENSI BERBASIS INTERNET OF THINGS (IOT) TERINTEGRASI DENGAN SIAKAD DI POLITEKNIK NEGERI MALANG. *JATI (Jurnal Mahasiswa Teknik Informatika)*, 9(3), 4009–4015. <https://doi.org/https://doi.org/10.36040/jati.v9i3.13531>
- Arifin, S. (2017). Peran guru pendidikan jasmani dalam pembentukan pendidikan karakter peserta didik. *Multilateral: Jurnal Pendidikan Jasmani Dan Olahraga*, 16(1). <https://doi.org/http://dx.doi.org/10.20527/multilateral.v16i1.3666>
- Azizah, N., Jannah, R., Wilantara, R. A., Fajri, A., & AH, M. R. (2024). Sistem Presensi Menggunakan Qr Code Dan Google Spredsheets Di Sekolah Madrasah Ibtidaiyah Di Desa Trebungan. *Jurnal Masyarakat Berdikari Dan Berkarya (Mardika)*, 2(1), 25–33. <https://doi.org/https://doi.org/10.55377/mardika.v2i1.9733>
- Cholifah, S. (2024). Educational Environment in the Implementation of Character Education. *Journal of Scientific Research, Education, and Technology (JSRET)*, 3(2), 816–825. <https://doi.org/https://doi.org/10.58526/jsret.v3i2.418>
- Elaskari, S., Imran, M., Elaskri, A., & Almasoudi, A. (2021). Using barcode to track student attendance and assets in higher education institutions. *Procedia Computer Science*, 184, 226–233. <https://doi.org/https://doi.org/10.1016/j.procs.2021.04.005>
- Ishaq, K., & Bibi, S. (2023). IoT based smart attendance system using RFID: A systematic literature review. *ArXiv Preprint ArXiv:2308.02591*. <https://doi.org/https://doi.org/10.48550/arXiv.2308.02591>
- Kamila, A. R., Derhass, G. H., Rabbani, D. A., Andry, J. F., & Lee, F. S. (2024). Aplikasi Absensi Berbasis Android Pada Sekolah Boarding Sebagai Transformasi Digital Bidang Pendidikan. *Nuansa Informatika*, 18(2), 26–34. <https://doi.org/https://doi.org/10.25134/ilkom.v18i2.155>
- inus, M. (2025). Peran E-Wallet Dalam Mendorong Perilaku Konsumsi Generasi Milenial. *Jurnal Ilmu Ekonomi Dan Bisnis*, 2(2), 19–24. <https://doi.org/https://doi.org/10.70134/jukoni.v2i2.458>
- Maulani, J., Kelana, J. B., & Jayadinata, A. K. (2022). Pengembangan LKPD berbantuan liveworksheet untuk meningkatkan pemahaman konsep IPA siswa kelas IV SD. *Jurnal Profesi Pendidikan*, 1(2), 106–123. <https://doi.org/https://doi.org/10.22460/jpp.v1i2.11613>
- Meinarni, N. P. S., Permana, I. P. H., Desnanjaya, I. G. M. N., Radhitya, M. L., & Winatha, K. R. (2021). *Pemanfaatan Teknologi Informasi Untuk Bisnis UMKM*. <https://doi.org/https://doi.org/10.31219/osf.io/t3jhp>
- Nisah, N., Widiyono, A., Milkhaturohman, M., & Lailiyah, N. N. (2021). Keefektifan Model Project Based Learning Terhadap Peningkatan Hasil Belajar IPA di Sekolah Dasar. *Pedagogi: Jurnal Penelitian Pendidikan*, 8(2). <https://doi.org/https://doi.org/10.25134/pedagogi.v8i2.4882>

- Nishom, M., Abidin, T., & Wiyono, S. (2023). Pemanfaatan teknologi QR-Code untuk presensi siswa di era disrupsi digital. *JMM (Jurnal Masyarakat Mandiri)*, 7(2), 1984–1992.
- Nusantara, G. L., Andrian, R., & Abdulmajid, N. W. (2025). Implementation of a Web-Based Student and Teacher Attendance System With QR Code Integration using the RAD. *INOVTEK Polbeng-Seri Informatika*, 10(1), 99–110.  
<https://doi.org/https://doi.org/10.35314/f2qvfs64>
- Rahmawati, A., & Fitriana, N. (2024). Efektifitas Penerapan Absensi Fingerprint Terhadap Disiplin Karyawan Di Pt. Mitra Angkutan Sejati. *Jurnal Ilmiah Manajemen, Ekonomi, & Akuntansi (MEA)*, 8(1), 1787–1798.  
<https://doi.org/https://doi.org/10.31955/mea.v8i1.3904>
- Sa'diyah, H. (2020). Model Research and Development dalam Pembelajaran Pendidikan Agama Islam. *EL-BANAT: Jurnal Pemikiran Dan Pendidikan Islam*, 10(1), 42–73.  
<https://doi.org/https://doi.org/10.54180/elbanat.2020.10.1.42-73>
- Shobri, M. (2024). Peran sistem informasi manajemen pendidikan dalam meningkatkan transparansi dan akuntabilitas di lembaga pendidikan Islam. *AKSI: Jurnal Manajemen Pendidikan Islam*, 2(2), 78–88.  
<https://doi.org/https://doi.org/10.37348/aksi.v2i2.302>
- Sofha, G. F., Nabila, I., Yusriyyah, M. Z., & Annisa, N. (2023). Peran pendidikan kewarganegaraan terhadap pembangunan karakter bangsa. *Advances In Social Humanities Research*, 1(4), 408–420.  
<https://doi.org/https://doi.org/10.46799/adv.v1i4.47>
- Wulandari, E. D., Lestari, R. D., & Faaiah, Y. N. (2024). Sinergi Profil Pendidikan Pancasila dan Nilai Islam di Sekolah Dasar. *Jurnal Pendidikan Islam*, 1(4), 14.  
<https://doi.org/https://doi.org/10.47134/pjpi.v1i4.760>