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Web-Based Madrasah Digital Report Card Management And Learning Outcome Quality: A PDCA-Based Comparative Study Of Two Indonesian Islamic Primary Schools

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Abstract

The web-based Madrasah Digital Report Card (RDM) is now used by more than fifty-five thousand madrasahs across Indonesia, yet the quality of its governance varies between institutions and has largely been judged in narrative terms. This study measures the effectiveness of web-based RDM management through the Plan-Do-Check-Act (PDCA) cycle, compares it across two Islamic primary schools, and tests its association with the quality of student learning outcomes. A quantitative, non-experimental, comparative-associational design was employed with teachers as the unit of analysis. The entire population of 22 teachers at MI Islamiyah Kedungbondo and MI Darunnajah Kemamang in Balen District, Bojonegoro Regency, was taken as the sample through total sampling. Data were collected using four-point Likert questionnaires comprising 16 items for RDM management effectiveness and 25 items for learning outcome quality (24 retained after item analysis), supplemented by Grade V report card records and an observation sheet. Cronbach's alpha reached .948 and .964. Because most distributions departed from normality, group differences were tested using the Mann-Whitney U test with tie correction, exact significance, and Bonferroni adjustment, while association was tested using Spearman correlation. RDM management effectiveness fell within the highly effective category at both

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madrasahs (88.41% and 95.16%), with Act emerging as the weakest stage at both sites. The between-school difference was not statistically supported (exact p = .381, rank-biserial r = .242). A moderate, positive, and statistically significant association was observed between the two variables (rho = .462, p = .031), with 21.34% shared variance. These findings are associational, confined to the two madrasahs studied, and are not interpreted causally.

Keywords: madrasah digital report card; PDCA cycle; learning outcome quality; comparative study; Islamic primary school.

INTRODUCTION

The digitalisation of academic services in Indonesian madrasahs is no longer a matter of debate. The Madrasah Digital Report Card (Rapor Digital Madrasah, hereafter RDM), developed by the Directorate of Madrasah Curriculum, Facilities, Institutions and Student Affairs of the Ministry of Religious Affairs, is now used by more than fifty-five thousand madrasahs nationwide and has become the backbone of learning assessment management from primary through senior secondary levels. The application transfers work that was once carried out on manual spreadsheets into a single web-based system that converts scores automatically, generates achievement descriptors, and opens an access channel through which parents can monitor their children's progress.

The policy context deserves to be established first. RDM emerged as a continuation of the earlier offline Digital Report Card Application, subsequently redeveloped as a web-based service connected to the national madrasah database. That transition carried two consequences at once. On the one hand, teachers' work became more economical because score conversion, descriptor generation, and report printing now occur automatically. On the other, the quality of the system's output became heavily dependent on the quality of its input and of its governance, since an error introduced at one stage is carried through until the report is printed.

Availability of the application, however, does not automatically translate into equivalent governance quality. Several studies record that RDM implementation follows official guidance at a technical level yet falls short of its objective of fast, accurate, and efficient assessment management, hampered by connectivity problems, server instability during end-of-semester input periods, and uneven digital literacy among teachers (Fajrin & Machali, 2023; Najmiah Molou & Paulus, 2026; Pratama et al., 2022). Comparable findings have been reported at both senior

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secondary and primary levels (Millah et al., 2024; Nuraini et al., 2022). Variation in governance quality across institutions is therefore a documented problem rather than a conjecture.

This dependence on governance is precisely why evaluating RDM cannot stop at asking whether the application is used. The more useful questions are how well the management process is executed, at which stage that process is weakest, and whether process quality is associated with the outcome it ultimately serves, namely the quality of student learning. The last question is rarely posed quantitatively at the Islamic primary level, even though this level has distinctive characteristics: few teachers per institution, a single class teacher responsible for nearly all subjects, and score-entry workload concentrated among a small number of staff.

The available literature displays two fairly consistent tendencies. First, most RDM studies are descriptive and qualitative, stopping at a portrait of the implementation process within a single institution (Aisida & Anam, 2020; Fajrin & Machali, 2023; Wahidin et al., 2023). Second, quantitative studies typically link digital report card use to teacher performance or professional competence rather than to student learning outcomes. Ibrahim et al. (2022), for instance, reported a strong and significant association between digital report card use and teacher performance across state Islamic junior secondary schools in Sumedang Regency, with a correlation coefficient of .644. Fahsya et al. (2020) reached a comparable conclusion at the primary level. Ma'ruf et al. (2023) linked an RDM-based management information system to madrasah education quality at a single senior secondary school and found a significant association. All of these studies operate within one site or one cluster of similar institutions, without comparing governance quality across institutions.

This gap defines the present study. Within the literature reviewed, no study was found that simultaneously performs three tasks: measuring RDM management quality against an explicit quality-management framework, comparing that quality across two institutions at the Islamic primary level, and testing its association with student learning outcome quality. This novelty claim is bounded by the search base used, namely nationally indexed journal databases and DOI registries covering 2020 to 2026, with the search terms rapor digital madrasah, digital report card application, digital assessment management, and their English equivalents.

It should be stated at the outset that this study is designed as an associational rather than a causal investigation. The design is non-experimental and cross-sectional, with no control over confounding variables, and therefore does not permit causal identification. All research questions, analyses, and conclusions are kept consistent at the level of association and shared

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variance. Within those limits, the study aims to describe the effectiveness of web-based RDM management and the quality of student learning outcomes at each madrasah, to test the difference in RDM management effectiveness between the two madrasahs, and to examine the statistical association and shared variance between the two variables.

Web-Based Madrasah Digital Report Card Management

Web-based RDM management is understood here as the entire process of managing learning assessment through the application, from preparing procedures and schedules, through entering and processing scores, verifying data completeness and accuracy, to following up on problems identified. This conception treats RDM not merely as software but as a management information system whose success is determined by the quality of the processes surrounding it.

Prior research offers a reasonably consistent picture of where the vulnerabilities lie. Fajrin and Machali (2023) found that teachers' command of the application was adequate, but that process continuity still depended on operator support and infrastructure readiness. Najmiah Molou and Paulus (2026) observed that RDM accelerated score entry and recapitulation and opened a monitoring channel for parents, yet network instability and server disruption recurred during end-of-semester input periods. Millah et al. (2024) reported similar findings at the senior secondary level. All three studies stop at a description of the process within a single institution.

At the Islamic primary level, Nuraini et al. (2022) described RDM implementation in learning assessment and highlighted the ease with which class teachers entered scores through the templates the system provides. Aisida and Anam (2020) reported that technical accompaniment remained necessary during the early stages of adoption. Both reinforce the impression that difficulties at this level reside more in governance than in technical mastery, a pattern also noted in broader accounts of madrasah digital transformation (Sari et al., 2024).

The PDCA Cycle as a Measurement Framework

The Plan-Do-Check-Act cycle was selected as the measurement framework because its four stages can be operationalised into measurable indicators rather than serving as quality rhetoric. Rachman (2020) demonstrated that PDCA can be tied directly to key performance indicators in Islamic educational institutions, so that each stage carries verifiable evidence of execution. Raihan et al. (2025) positioned PDCA as the core component of educational quality

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strengthening through continuous improvement, while Jami and Muharam (2022) illustrated its application in quality assurance for religious education study programmes.

In the RDM context, the four stages map onto actual madrasah work with reasonable precision. Plan encompasses the drafting of procedures and input schedules together with device readiness. Do covers the consistency and completeness of score entry and the use of system features. Check involves periodic monitoring, verification of data against physical assessment evidence, and validation prior to report printing. Act comprises documented handling of technical problems and the use of evaluation findings to improve the subsequent cycle.

Learning Outcome Quality and the Status of Assessment Data

Learning outcome quality is deliberately separated into two strata in this study. The first is teachers' appraisal of achievement quality and of how assessment data are used, captured through a questionnaire. The second is student achievement as recorded in report cards. The distinction matters because the two are frequently treated as a single construct even though their units of observation differ: the former is the teacher, the latter the student.

International literature supports this caution. Parveen et al. (2024) found that quality management practices related to student performance through school culture as a mediator rather than directly. Engida et al. (2024) showed that teaching quality is associated with student achievement, but that the strength of the association varies across the dimensions measured. Razak et al. (2023), in a systematic review, noted that teachers' digital transformation operates at the level of readiness and practice, which does not automatically extend to student attainment. The methodological implication of all three converges: associations between management quality and student attainment are generally layered and indirect. Sudiyanto et al. (2015) reach a comparable conclusion regarding the distance between assessment systems and learning gains.

Table 1. Summary of Prior Studies and the Position of the Present Study

Study	Level	Approach	Limitation addressed by this study
Pratama et al. (2022)	Madrasah	Descriptive qualitative	No test of between-institution difference or of association with learning outcomes

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Study	Level	Approach	Limitation addressed by this study
Fajrin & Machali (2023)	Primary	Descriptive qualitative	Confined to process description at a single site
Ma'ruf et al. (2023)	Senior secondary	Quantitative correlational	Single site, no cross-institutional comparison
Ibrahim et al. (2022)	Junior secondary	Quantitative correlational	Dependent variable is teacher performance, not learning outcome quality
Najmiah Molou & Paulus (2026)	Junior secondary	Descriptive qualitative	No statistical testing
Present study	Primary	Comparative-associational	Tests between-institution difference and association with learning outcome quality

Source: authors' review of the literature, 2026.

Conceptual Framework and Hypotheses

On the basis of the review above, this study positions web-based RDM management effectiveness as a variable associated with student learning outcome quality, without assuming a direction of influence. Two hypotheses are advanced. The first states that the distribution of RDM management effectiveness scores differs between the two madrasahs. The second states that a positive association exists between web-based RDM management effectiveness and teacher-rated student learning outcome quality. Both are tested using non-parametric procedures appropriate to the distribution of the data and the size of the sample.

DISCUSSION

Effectiveness of Web-Based RDM Management

RDM management effectiveness fell within the highly effective category at both madrasahs. The mean score at MI Islamiyah Kedungbondo was 3.536, or 88.41%, while MI Darunnajah Kemamang reached 3.806, or 95.16%. Stage-level detail appears in Table 5.

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Table 5. Web-Based RDM Management Effectiveness by PDCA Stage

PDCA stage	Kedungbondo	%	Darunnajah	%
Plan	3.472	86.81	3.900	97.50
Do	3.594	89.84	3.850	96.25
Check	3.583	89.58	3.800	95.00
Act	3.458	86.46	3.675	91.88
Overall mean	3.536	88.41	3.806	95.16

Source: primary data, 2026.

The most striking pattern in Table 5 is not the gap between institutions but the consistent location of the weakest point. At both madrasahs, Act received the lowest score among the four stages. This stage concerns follow-up on monitoring findings: revising procedures, updating task allocation, and adjusting schedules in light of problems encountered during the current semester. By contrast, Plan attained the highest score at MI Darunnajah Kemamang, whereas at MI Islamiyah Kedungbondo the highest score fell to Do.

The interpretive ranges were fixed before data collection, and every stage at both sites exceeded the 3.26 threshold. Categorical interpretation therefore fails to distinguish the two institutions. Differences become visible only when scores are read as numbers, which is precisely why descriptive analysis required statistical testing to follow.

Learning Outcome Quality

Teacher-rated learning outcome quality reached 80.56% at MI Islamiyah Kedungbondo and 93.02% at MI Darunnajah Kemamang. As a comparison drawn at a different level of data, mean Grade V report card scores for the even semester were practically equivalent at 86.25 and 87.58. Table 6 sets the two sources side by side.

Table 6. Learning Outcome Quality from Two Data Sources

Data source	Kedungbondo	Darunnajah	Gap
Teacher rating (%)	80.56	93.02	12.46

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Data source	Kedungbondo	Darunnajah	Gap
Mean report card score	86.25	87.58	1.33
Grade V students (n)	15	13	—

Source: teacher questionnaire and Grade V report card records, even semester 2025/2026.

The gaps differ substantially between the two sources. Teacher ratings diverge by 12.46 percentage points, whereas student report card scores differ by only 1.33 points. This divergence constitutes one of the study's more consequential findings and is examined separately below.

Between-School Comparison

Mann-Whitney results for total RDM management effectiveness scores revealed no statistically supported difference. Table 7 summarises the comparisons on total scores and on each PDCA stage.

Table 7. Mann-Whitney U Test Results

Object of test	U	z	Exact p	Rank-biserial r	Decision
Total score X	45.500	−0.972	.381	.242	Fail to reject H_o
Plan stage	25.000	−2.308	.021	.583	Fail to reject H_o*
Do stage	41.000	−1.283	.211	.317	Fail to reject H_o
Check stage	48.000	−0.797	.447	.200	Fail to reject H_o
Act stage	52.000	−0.520	.624	.133	Fail to reject H_o
Total score Y	16.000	−2.868	.004	.742	Reject H_o
Report card scores	—	—	.269	—	Fail to reject H_o

**Does not survive Bonferroni adjustment at α = .0125. Source: analysis of research data, 2026.*

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Three observations follow from Table 7. First, the overall difference in RDM management effectiveness was not supported, with a rank-biserial correlation of .242 indicating a small to moderate effect. Second, the largest gap did occur at the Plan stage, with an exact p of .021, but this value does not survive Bonferroni adjustment across the family of five comparisons. Third, teacher-rated learning outcome quality differed significantly with a large effect size, whereas student report card scores did not. These last two results derive from different units of observation, teachers and students respectively, and cannot be collapsed into a single conclusion.

Association and Shared Variance

Spearman correlation between RDM management effectiveness and teacher-rated learning outcome quality yielded a coefficient of .462 with p = .031. The association is positive, moderate in strength, and significant at the .05 level. Table 8 summarises the association analysis together with the comparison regression.

Table 8. Association and Comparison Regression Results

Statistic	Value	Note
Spearman rho	.462	Positive, moderate, significant (p = .031)
Shared variance (rho^2)	21.34%	Proportion of variance held in common
Regression equation	Y = 1.273 + 0.595X	Comparison only, not a causal model
R^2	.308	Reported alongside the adjusted value
Adjusted R^2	.273	More conservative estimate for n = 22

Source: analysis of research data, 2026.

The gap between R^2 and adjusted R^2 reflects the small sample. Both are reported together so that readers can assess estimation uncertainty, and the shared variance derived from the

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Spearman coefficient is treated as the headline figure because it is consistent with the non-parametric test on which the analysis rests.

DISCUSSION

Act as the Recurring Weakest Stage

The finding that Act received the lowest score at both madrasahs is better read as a pattern than as coincidence. The first three PDCA stages involve scheduled and documented work: drafting a plan, entering scores, and verifying completeness. Act demands something different, namely changing working practice in the next cycle on the basis of what was learned in the current one. That work carries no binding administrative deadline, which makes it the easiest to postpone.

The pattern accords with earlier observations that RDM implementation follows official guidance technically yet falls short of fast, accurate, and efficient assessment management (Fajrin & Machali, 2023; Pratama et al., 2022). The present study adds an explanatory layer: the weakness lies not in the capacity to operate the application but in a continuous-improvement mechanism that has yet to be institutionalised. Literature on educational quality management points in the same direction, noting that operationalising the checking and follow-up stages within daily practice is the gap most frequently left unattended (Rachman, 2020; Raihan et al., 2025).

The Absence of Difference and Its Meaning

A gap of 6.75 percentage points between the two madrasahs appears substantial when read descriptively, yet it was not statistically supported. This result must not be read as evidence that the two institutions are equivalent. Within an inferential framework, failure to attain significance means that the available data are not strong enough to reject the null hypothesis, not that the null hypothesis is true. With 22 respondents, statistical power is low, so a moderate difference may well escape detection.

The Plan stage illustrates the point. Its exact p of .021 accompanies a rank-biserial correlation of .583, a large effect, yet the value does not survive Bonferroni adjustment. The decision to retain the adjustment was made because five comparisons were conducted within the same hypothesis family, and reporting only the results that pass without adjustment would

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overstate confidence. The Plan stage finding is therefore treated as a lead worth retesting on a larger sample rather than as a conclusion.

Two Data Sources Moving in Different Directions

The most consequential finding of this study lies in the discrepancy between the two data sources in Table 6. Teacher ratings of learning outcome quality differed significantly between institutions with a large effect size, while report card scores for the same grade did not differ significantly and were separated by only 1.33 points.

The most parsimonious explanation is that the two sources measure different things. The questionnaire captures teacher perception, and it was completed by the same respondents who completed the Variable X questionnaire. That arrangement opens the way to common-method bias, the tendency for respondents to answer consistently across two instruments administered in sequence. Report card scores, by contrast, are student-level outputs generated through a standardised assessment process. When two sources move in different directions, claims about learning outcome quality are better anchored in the source closer to student attainment, with teacher ratings treated as a perception variable.

The methodological consequence is clear. Subsequent research seeking to test the link between RDM governance and student attainment should place student-level data as the primary outcome and analyse it at its own level, rather than combining two levels of data within a single model without appropriate treatment.

Table 9. Positioning the Findings against Prior Studies

Study	Dependent variable	Coefficient	Comparative note
Ibrahim et al. (2022)	Teacher performance	.644	Dependent variable close to the administrative work the application eases
Ma'ruf et al. (2023)	Madrasah education quality	Significant	Single site, senior secondary level

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Study	Dependent variable	Coefficient	Comparative note
Fahsya et al. (2020)	Teacher performance	Significant	State primary school level
Present study	Teacher-rated learning outcome quality	.462	Dependent variable further along the process chain

Source: authors' review of the literature, 2026.

Table 9 reveals a reasonably orderly pattern. The further the dependent variable sits from the work the application directly eases, the smaller the association coefficient. This pattern is consistent with the finding of Parveen et al. (2024) that quality management practices relate to student performance through a mediator, and with the observation of Razak et al. (2023) that teachers' digital transformation operates at the level of readiness and practice without automatically extending to student attainment.

A Moderate Association and Its Interpretive Limits

The narrowness of the response distribution also merits treatment as a finding rather than as a technical nuisance. All responses clustered within the two highest categories, and at the Plan stage in MI Darunnajah Kemamang every respondent returned an identical score. This condition may signal either genuinely uniform high governance quality or a tendency for respondents to rate their own institution favourably. The present design cannot separate the two possibilities, so subsequent research should incorporate an external source of appraisal, such as supervisory inspection results or an audit of data completeness within the system.

A coefficient of .462 with 21.34% shared variance places the association between the two variables at a moderate level. This figure is lower than the .644 reported by Ibrahim et al. (2022) for the association between digital report card use and teacher performance. The difference in magnitude is plausible because the dependent variables differ. Teacher performance sits closer to the administrative work the application simplifies, whereas learning outcome quality lies several steps further along the process chain.

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That distance is itself informative. If RDM governance does relate to student attainment, the relationship most likely operates indirectly, through an intermediate chain: better-organised assessment data enable faster feedback to students and parents, that feedback enables pedagogical follow-up, and it is the follow-up that relates to attainment. This chain is proposed as a mechanism hypothesis for subsequent research rather than as an empirical finding of the present study, since none of its intermediate variables was measured.

Implications for Madrasah Governance

For madrasah administrators, the finding concerning the Act stage points toward a reasonably concrete course of action. Follow-up requires an administrative form so that it does not depend on individual initiative, for instance a scheduled evaluation meeting at the close of each input period producing an improvement list that specifies activities, responsible parties, deadlines, and output evidence. Without such a form, Act will remain the stage most easily deferred because it lacks the binding deadlines that govern score entry and report printing.

For supervisors and district-level offices of the Ministry of Religious Affairs, these findings suggest a shift in the focus of professional support. RDM support has so far been directed largely toward training in operating the application, yet both madrasahs in this study already fall within the highly effective category at the implementation stage. What remains underdeveloped is the mechanism for continuous improvement. Support targeting the design of follow-up procedures is likely to prove more valuable than additional technical training.

Limitations

Several limitations warrant open acknowledgement. A sample of 22 respondents drawn from two institutional clusters yields low statistical power, and observations are not fully independent. Item validity testing and hypothesis testing were conducted on the same respondents, introducing a risk of capitalisation on chance during item selection. Variables X and Y were completed by the same respondents, so common-method bias cannot be ruled out. Score distributions on both variables were high and narrow, which may attenuate the observed correlation through a ceiling effect. Finally, the comparability of report card data across institutions cannot be fully guaranteed given differences in assessment practice between sites.

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CONCLUSION

Web-based RDM management effectiveness at the two Islamic primary schools studied falls within the highly effective category, with Act constituting the weakest point at both sites. The difference in effectiveness between institutions is not statistically supported, and the largest gap, at the Plan stage, does not survive adjustment for multiple comparisons. A positive, moderate, and statistically significant association exists between RDM management effectiveness and teacher-rated learning outcome quality, with roughly 21% shared variance.

All of these conclusions are associational and confined to the two madrasahs investigated. Two practical implications follow. For madrasah administrators, the most pressing area for strengthening is not training in operating the application but the institutionalisation of the follow-up stage. For subsequent researchers, the discrepancy between teacher ratings and report card scores identified here indicates that student attainment should be measured directly and analysed at its own level, with a sample large enough to detect differences of moderate magnitude.

FUTURE DIRECTIONS

future studies could involve a larger number of Islamic primary schools across different regions of Indonesia to strengthen the generalizability of findings and identify variations in digital management practices according to school characteristics, technological infrastructure, and institutional capacity. Second, longitudinal research is needed to examine whether the systematic application of the Plan–Do–Check–Act (PDCA) cycle produces sustainable improvements in students' learning outcomes, teacher performance, assessment accuracy, and administrative efficiency over several academic years. Future research could also integrate learning analytics and artificial intelligence into web-based report card systems to provide early identification of learning difficulties, individualized recommendations, and more timely feedback for teachers, students, and parents. In addition, qualitative studies involving teachers, school leaders, parents, and students could explore user experiences, digital literacy, data security concerns, and organizational factors that influence successful implementation..

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