IMPLEMENTATION OF COLLABORATIVE SUPERVISION IN TEACHER PROFESSIONAL EMPOWERMENT AT MAN 3 BANDA ACEH: A MANAGEMENT INFORMATION SYSTEM PERSPECTIVE

Zulkarnaini[1)] , Yusra Jamali[2)]
[1,2] Universitas Islam Negeri Ar-Raniry Banda Aceh, Indonesia
Email: [1]zulkarnaini.mpd@ar-raniry.ac.id; [2]yusrajamali@ar-raniry.ac.id
E-mail Correspondent: zulkarnaini.mpd@ar-raniry.ac.id

ABSTRACT

The efficacy of Islamic secondary schools (Madrasah Aliyah) hinges on the professional agency and continuous pedagogical refinement of their teaching staff. This qualitative case study explores how integrating a Management Information System (MIS) into collaborative supervision frameworks fosters teacher professional empowerment at MAN 3 Banda Aceh. Fieldwork involved semi-structured interviews, non-participant observations, and document analysis with the principal, academic vice-principal, instructional supervisors, and a stratified sample of teachers. Thematic analysis, validated through source and methodological triangulation, revealed that digitizing the supervisory process shifts the paradigm from hierarchical compliance to egalitarian, evidence-based professional dialogue. Utilizing MIS dashboards for pre-observation goal alignment and post-observation reflective analytics, teachers reported significant gains in instructional autonomy, self-efficacy, and digital fluency. The findings offer a scalable, technology-mediated model for educational administrators aiming to modernize human resource development in religious educational contexts.
Keywords: Collaborative Supervision, Management Information System, Teacher Empowerment, Madrasah Aliyah, Educational Leadership.

ABSTRAK

Efikasi sekolah menengah Islam (Madrasah Aliyah) bergantung pada agensi profesional dan penyempurnaan pedagogis berkelanjutan dari staf pengajar mereka. Studi kasus kualitatif ini mengeksplorasi bagaimana integrasi Sistem Informasi Manajemen (SIM) ke dalam kerangka supervisi kolaboratif mendorong pemberdayaan profesional guru di MAN 3 Banda Aceh. Kerja lapangan melibatkan wawancara semi-terstruktur, observasi non-partisipan, dan analisis dokumen dengan kepala sekolah, wakil kepala bidang akademik, pengawas instruksional, dan sampel guru yang terstratifikasi. Analisis tematik, divalidasi melalui triangulasi sumber dan metodologis, mengungkapkan bahwa mendigitalkan proses supervisi menggeser paradigma dari kepatuhan hierarkis menjadi dialog profesional yang egaliter dan berbasis bukti. Dengan menggunakan dashboard SIM untuk penyelarasan tujuan pra-observasi dan analitik reflektif pasca-observasi, guru melaporkan peningkatan signifikan dalam otonomi instruksional, efikasi diri, dan kelancaran digital. Temuan ini menawarkan model yang dapat diskalakan dan dimediasi

teknologi bagi administrator pendidikan yang bertujuan memodernisasi pengembangan sumber daya manusia dalam konteks pendidikan keagamaan.
Kata kunci: *Supervisi Kolaboratif, Sistem Informasi Manajemen, Pemberdayaan Guru, Madrasah Aliyah, Kepemimpinan Pendidikan.*

A. INTRODUCTION

Indonesian Islamic secondary schools (*madrasah aliyah*) currently navigate a complex dual mandate: preserving traditional religious pedagogy while adopting modern, data-driven administrative practices. This transition requires a fundamental shift in how school leadership manages its most critical asset—the teaching faculty—especially amidst the digital disruption of conventional educational paradigms (Abrams et al., 2021). MAN 3 Banda Aceh, a prominent public madrasah in Aceh Province, exemplifies this transitional phase, necessitating innovative instructional leadership approaches that accommodate both digital transformation and localized cultural dynamics (Diah Khoirohnissah, 2023). Building teacher professional capital in the post-pandemic era demands deeper collaboration and sustained systemic support, moving beyond superficial technological adoption to profound pedagogical integration (Hargreaves & Fullan, 2020).

Conventionally, instructional supervision in Indonesian educational settings has relied on directive, evaluative models. In such frameworks, supervisors act as compliance auditors, a practice that frequently induces performance anxiety and stifles pedagogical innovation (Tian & Nutbrown, 2023). Recognizing these limitations, contemporary educational scholarship advocates for collaborative supervision. This model repositions the supervisor as a critical friend and co-inquirer, fostering an environment of mutual problem-solving and reflective dialogue (García-Grau et al., 2019). When executed effectively, collaborative supervision directly catalyzes teacher professional empowerment, enhancing educators' decision-making authority, instructional self-efficacy, and overall professional status (Cai et al., 2022). Strong claims about successful school leadership consistently demonstrate that the greatest influence of leaders on student outcomes occurs indirectly through the development of teacher capacity and empowerment (Leithwood et al., 2019).

Concurrently, the deployment of Management Information Systems (MIS) has redefined educational administration. Modern MIS platforms transcend basic record-keeping, functioning as analytical hubs that track instructional metrics, streamline communication, and facilitate evidence-based decision-making (Martins et al., 2019). Teacher data use for instructional improvement relies heavily on motivation, data expertise, and a supportive school context (Vanlommel et al., 2020). In the context of madrasah education, integrating MIS into academic workflows has proven vital for

ensuring institutional transparency and quality assurance. Research by (Fitriani & Hakim, 2021) on madrasah principal leadership patterns in collaborating with school committees indicates that effective collaboration requires transparent and systematic communication infrastructure, which can be facilitated by information technology.

Despite the established merits of both collaborative supervision and educational MIS, a distinct empirical void exists regarding their intersection. Existing literature typically examines MIS strictly through an administrative or financial lens, while studies on collaborative supervision predominantly focus on face-to-face, non-digital interactions (Yosepa et al., 2025). Furthermore, research investigating how digital infrastructure mediates developmental feedback loops within the specific cultural and religious context of Acehnese madrasahs remains largely unexplored. Nurjannah et al. (2021), in their study on teacher performance management in improving Islamic Religious Education lesson learning, emphasize the importance of a systematic and structured approach to educator performance management, which can be strengthened through technology integration. This study addresses this gap by investigating the operationalization of an MIS-integrated collaborative supervision model at MAN 3 Banda Aceh, specifically examining how this technological-pedagogical synergy influences the multidimensional construct of teacher professional empowerment.

B. LITERATURE REVIEW

1. Collaborative Supervision and Constructivist Pedagogy

Collaborative supervision is deeply rooted in social constructivism and adult learning theory (*andragogy*). It operates on the premise that teachers are not passive recipients of administrative directives but are self-directed professionals capable of rigorous self-evaluation and pedagogical refinement. Unlike traditional directive models where the supervisor dictates actions and enforces compliance, collaborative supervision emphasizes shared goal-setting, joint classroom observations, and the co-construction of instructional improvements (Sahudi & Ma'arif, 2024); (Maisyaroh et al., 2021).

This approach transforms the supervisory relationship from a hierarchical inspection into a collegial partnership. Recent scholarship consistently demonstrates the superiority of collaborative approaches over directive inspections, noting that distributed, collaborative leadership flattens hierarchical barriers, thereby reducing teacher burnout and stimulating instructional innovation (AlAjmi, 2022). By engaging in mutual problem-solving, teachers develop a deeper understanding of their instructional practices, transforming routine teaching into a reflective, research-oriented endeavor.

2. Teacher Professional Empowerment Theory

Teacher empowerment encompasses the structural and psychological processes through which educators gain authority over their professional environments. Grounded in the seminal work of Short and Rinehart, empowerment is operationalized across multiple dimensions, including decision-making autonomy, opportunities for professional growth, elevated professional status, robust self-efficacy, and a tangible sense of impact on school improvement. Contemporary research firmly links empowerment to institutional resilience and educational quality. Cai et al. (2022) identify a strong positive correlation between empowerment and teaching effectiveness, demonstrating that autonomous educators exhibit greater pedagogical adaptability and work engagement. Furthermore, (Klassen et al., 2013) highlight that teacher engagement is deeply tied to their psychological well-being and the structural support they receive. Crucially, empowerment acts as a buffer against burnout, as it fortifies teachers' self-efficacy beliefs regarding their ability to manage classroom complexities and influence student achievement in increasingly complex educational environments (Gordon et al., 2023).

3. Management Information Systems and Data-Driven Decision Making

An Educational Management Information System (EMIS) provides the digital architecture necessary for collecting, processing, and disseminating institutional data. Modern platforms utilize cloud infrastructure and visual analytics to optimize administrative workflows and support strategic leadership. The role of MIS in education has evolved from passive data storage to active, analytics-driven leadership. Martins et al. (2019) describe modern EMIS platforms as the central nervous system of schools, enabling evidence-based resource allocation and educational innovation. Schildkamp et al. (2019) emphasize that data-driven decision-making, facilitated by robust MIS, allows leaders to rapidly identify instructional bottlenecks and deploy targeted interventions. However, the efficacy of such systems depends heavily on the users' data literacy and the organizational culture surrounding data use (Vanlommel et al., 2016). When integrated into supervisory frameworks, MIS can serve as an objective mediator, grounding reflective discussions in empirical evidence rather than subjective impressions.

4. Islamic Educational Management Perspective: *Syura* and *Tazkiyatun Nafs*

Within the context of Islamic Educational Management (Manajemen Pendidikan Islam), collaborative supervision and teacher empowerment can be conceptually aligned with the principles of *syura* (mutual consultation) and *tazkiyatun nafs* (purification and development of the self). Syura emphasizes collective decision-making, mutual respect, and the valuing of diverse perspectives, which perfectly mirrors the egalitarian nature of collaborative supervision. Furthermore, the reflective practice

inherent in this supervisory model aligns with *tazkiyatun nafs*, encouraging educators to engage in deep, honest introspection regarding their professional conduct and pedagogical impact. Integrating modern MIS with these foundational Islamic principles creates a culturally resonant framework for professional development in madrasahs, ensuring that technological adoption enhances rather than alienates the institution's spiritual and communal values.

C. METHOD

This investigation utilized a qualitative, exploratory case study design. This methodological choice was driven by the need to capture the nuanced, contextualized interactions between human perceptions, supervisory practices, and technology-mediated workflows within the specific ecological setting of MAN 3 Banda Aceh. A qualitative approach allows researchers to explore complex phenomena in depth from the participants' perspectives, making it ideal for investigating the intersection of technology and human resource development (Fusch & Ness, 2015).

Participants were selected via purposive sampling to ensure comprehensive insights from all stakeholders involved in the supervisory ecosystem. The cohort included: (1) one School Principal (strategic decision-maker); (2) one vice principal of academic affairs (operational coordinator); (3) two internal instructional supervisors (direct implementers); and (4) eight teachers (stratified to capture diverse perspectives: four senior educators with >10 years of tenure, and four junior educators with <5 years of tenure).

The researcher functioned as the primary instrument for data collection and interpretation. Supplementary tools included: (1) semi-structured interview guides formulated around the dimensions of collaborative supervision and the constructs of teacher empowerment; (2) non-participant observation protocols designed to capture behavioral dynamics during pre-observation negotiations, live classroom monitoring, and post-observation feedback sessions; and (3) document analysis rubrics utilized to evaluate digital artifacts within the MIS, including uploaded lesson plans, observational logs, and Continuous Professional Development (CPD) portfolios.

Fieldwork was conducted over a six-month period utilizing three concurrent techniques: (1) In-depth interviews: audio-recorded sessions lasting 45 to 90 minutes, focusing on participants' lived experiences with the MIS-integrated supervisory process; (2) Field observations: direct monitoring of the supervisory workflow, specifically observing how stakeholders interacted with the MIS dashboard during collaborative sessions; and (3) Document analysis: systematic review of digital records stored in the MAN 3 Banda Aceh MIS, including peer-review logs and self-assessment metrics.

Data were processed using the interactive model of data condensation, display, and conclusion drawing. Reflexive thematic analysis was applied to extract, code, and synthesize patterns from the raw data, following rigorous guidelines to ensure the quality of analytical practice (Braun & Clarke, 2020). The coding framework combined deductive codes (derived from the theoretical framework) with inductive codes (emerging organically from the field data).

Rigor was maintained through stringent quality criteria (Ahmed, 2024); (Nowell et al., 2017): (1) Credibility: established via source triangulation (cross-verifying accounts from principals, supervisors, and teachers) and methodological triangulation (corroborating interview claims with observational and documentary evidence) (Schlunegger et al., 2024); (Cypress, 2017). Member checking was also employed; (2) Transferability: ensured by providing thick, descriptive accounts of the institutional context, technological infrastructure, and demographic profiles of the participants; (3) Dependability and confirmability: maintained through a comprehensive audit trail of all methodological decisions, raw transcripts, and coding matrices, supplemented by a researcher reflexivity journal to mitigate bias (Alam et al., 2025).

D. RESULTS AND DISCUSSION

1. Results

The findings indicate that MAN 3 Banda Aceh has successfully deployed a web-based MIS to restructure its instructional supervision into a comprehensive, four-stage collaborative cycle. This digital transformation has fundamentally altered the operational mechanics of teacher evaluation and professional development.

Stage 1: Digital Pre-Observation Goal Negotiation

The supervisory process initiates asynchronously via the MIS portal. Educators upload their instructional modules, lesson plans, and self-identified focus areas into the system. Crucially, the system mandates a digital consensus between the teacher and the supervisor regarding specific observational targets (e.g., differentiated instruction, student engagement metrics, integration of digital tools). One senior educator noted: "In the past, supervisors arrived with rigid, standardized rubrics that felt like a checklist for compliance. Now, through the MIS portal, I dictate the pedagogical focus before the observation even begins. It shifts the dynamic from being inspected to being supported".

Stage 2: Data-Informed Classroom Observation

During live instruction, supervisors utilize mobile interfaces linked to the MIS. Rather than relying on subjective narrative notes or generalized impressions, they input timestamped quantitative and qualitative indicators aligned with the pre-negotiated goals. The system captures objective metrics such as instructional time distribution, teacher-student interaction ratios, and the frequency of higher-order thinking questions.

This data entry is seamless and unobtrusive, allowing the supervisor to remain focused on the classroom dynamics.

Stage 3: Transparent Post-Observation Feedback Dialogue

Within a 48-hour window, the supervisor and teacher convene for a feedback session guided by the MIS-generated visual dashboard. The supervisor utilizes the objective data visualizations—such as pie charts of time allocation and bar graphs of student participation—to prompt reflective questioning. This allows the teacher to lead the analytical process, identifying their own instructional strengths and areas for refinement based on empirical evidence rather than subjective critique.

Stage 4: Systemic Continuous Professional Development (CPD) Mapping

The MIS aggregates individual supervisory data to identify macro-level institutional trends. When the system detects recurring pedagogical challenges across specific departments, the academic leadership utilizes this diagnostic data to design and deploy targeted, context-specific internal workshops, ensuring that professional development is directly responsive to identified needs. The integration of the MIS into the collaborative framework yielded measurable impacts across the core dimensions of teacher empowerment, as synthesized in the thematic matrix below.

Table 1. Thematic Matrix of Teacher Empowerment Outcomes

Empowerment Dimension	Manifestation in MIS-Integrated Supervision	Representative Participant Insight
Autonomy	Self-selection of supervisory focus areas via digital portal; reduction of arbitrary evaluation anxiety.	"I feel like the architect of my own professional growth, not just a subject of it." (Teacher, 8 years exp.)
Professional Growth	ongitudinal tracking of pedagogical evolution via dynamic digital portfolios.	"I can literally see my teaching strategies improving over the semesters on my dashboard." (Teacher, 3 years exp.)
Self-Efficacy	Reinforcement of confidence through objective visual evidence of instructional success.	"Seeing the data show high student engagement validated my new teaching method." (Teacher, 12 years exp.)

Decision-Making	Utilization of aggregated MIS analytics to advocate for instructional policy adjustments.	"We used the department data to convince the principal to change the textbook." (Vice Principal)
Status & Collegiality	Identification of high-performing educators for peer-coaching roles; fostering horizontal mentoring.	"Being recognized as a peer coach on the system gave me a new sense of professional pride." (Teacher, 15 years exp.)

2. Discussion

The empirical evidence from MAN 3 Banda Aceh strongly supports the constructivist premise that supervision is most effective when framed as a collaborative, growth-oriented dialogue rather than a compliance audit (Maisyaroh et al., 2021); (Tian & Nutbrown, 2023). The introduction of the Management Information System (MIS) into this dynamic resolves a persistent vulnerability in traditional collaborative supervision: the risk of subjective bias and unfocused reflection (Yosepa et al., 2025). By anchoring discussions in empirical, digitized classroom data, the supervisory relationship becomes inherently more egalitarian. This aligns with strong claims about successful school leadership, which assert that the greatest influence of leaders on student outcomes occurs indirectly through the development of teacher capacity, motivation, and empowerment (Leithwood et al., 2020).

When supervisors and teachers sit before an MIS dashboard displaying visual observation data, traditional hierarchies dissolve, replaced by an evidence-based partnership grounded in mutual respect. The most prominent impact of this integration lies in the enhancement of teacher autonomy and self-efficacy. Instructional autonomy is a fundamental dimension of teacher empowerment, and this study demonstrates that the ability of teachers to select their own supervisory focus via a digital portal significantly reduces the anxiety associated with arbitrary evaluations. This cultivates a culture of proactive self-regulation where teachers feel in control of their professional development. These findings are reinforced by Cai et al. (2022), who identified a strong positive correlation between teacher empowerment and teaching effectiveness, demonstrating that autonomous educators exhibit greater pedagogical adaptability and work engagement.

Furthermore, the presentation of objective visual evidence of instructional success on the MIS dashboard directly reinforces educators' confidence. This correlates with Gordon et al. (2023) assertion that data-driven feedback mechanisms significantly enhance teacher self-efficacy in the digital age. When teachers can view positive student

engagement metrics recorded by the system, their belief in their capacity to influence student learning outcomes becomes more robust. This also aligns with (Lutovac, 2020), who proved that structured peer coaching and feedback positively affect teachers' instructional practices and self-efficacy. Within the context of MAN 3 Banda Aceh, the digital portfolio feature of the MIS allows teachers to track their pedagogical evolution longitudinally, removing the ambiguity from continuous learning and aligning with effective models of continuous professional development (Suryawati et al., 2024); (Asterhan & Lefstein, 2023).

Data-driven decision-making is another aspect significantly strengthened by this system. The aggregated MIS analytics provide educators with empirical leverage they previously lacked. Teacher representatives utilize this aggregated data to advocate for specific instructional policy adjustments during academic council meetings, a tangible manifestation of the decision-making dimension of teacher empowerment. Teacher data use for instructional improvement relies heavily on motivation, data expertise, and a supportive school context (Vanlommel et al., 2016). The MIS at MAN 3 Banda Aceh successfully creates a supportive context by simplifying data visualization, enabling teachers who may lack a strong data analysis background to understand and utilize the information for decision-making. This indicates that technology, when designed with a user-centric approach, can democratize access to institutional data and distribute leadership more evenly across the organization.

In the specific context of Islamic education management in Indonesia, these findings make a significant contribution to the growing literature. Research by (Fitriani & Hakim, 2021) on madrasah principal leadership patterns in collaborating with school committees shows that effective collaboration requires transparency and structured communication systems. The findings at MAN 3 Banda Aceh align with this, where the MIS platform provides a transparent infrastructure that facilitates collaborative dialogue not only with the school committee but internally between supervisors and teachers. The MIS dashboard, which visually displays observation data, creates an equitable dialogue space where both parties can refer to objective evidence rather than subjective impressions. This reduces the hierarchical tensions that often arise in traditional supervision and fosters a culture of mutual trust, which is highly valued in Islamic values such as "*ukhuwah*" (brotherhood) and "*musyawarah*" (consultation).

Furthermore, Nurjannah et al. (2021), in their study on teacher performance management in improving Islamic Religious Education lesson learning, emphasize the importance of a systematic and structured approach to educator performance management. The integration of MIS in collaborative supervision at MAN 3 Banda Aceh embodies this principle by providing a structured and sustainable performance tracking system. This system does not merely record single observation results but builds a

portfolio of teachers' professional development over time. This longitudinal approach allows teachers and supervisors to identify growth patterns, areas requiring continuous attention, and progress achieved. This aligns with the concept of teacher empowerment that emphasizes autonomy and continuous professional growth, as well as efforts to improve teacher professionalism through comprehensive performance-based supervision (Asyari, 2020).

From the perspective of Islamic Educational Management, the implementation of this system beautifully operationalizes the concept of "*syura*" (mutual consultation). In traditional supervision, the flow of information and judgment is largely unilateral. However, the MIS-mediated collaborative model ensures that both the supervisor and the teacher have equal access to the observational data before the feedback session. This parity of information creates a true environment for "*syura*", where decisions regarding instructional improvements are made collectively, respecting the teacher's professional agency.

Additionally, the reflective practice encouraged by the MIS dashboard aligns closely with the concept of "*tazkiyatun nafs*" (purification and development of the self). By confronting objective data regarding their teaching performance, teachers are prompted to engage in deep, honest introspection, identifying their flaws and strengths without the defensive reactions typically triggered by subjective human criticism. This technological mediation acts as a neutral mirror, facilitating a purer form of professional self-reflection.

Digital transformation in Islamic education also requires adaptive and visionary leadership (FR et al., 2021) in their study on school principal leadership in the Education 4.0 Era emphasize that educational leaders must be able to integrate technology to improve management and learning quality. The implementation of MIS at MAN 3 Banda Aceh is concrete evidence of effective digital leadership, where the principal and academic vice-principal do not merely adopt technology for administrative efficiency, but strategically use it to empower their human resources. Amidst disruptive times, school leadership must be able to navigate change and build institutional resilience (Harris & Jones, 2020). This MIS-based collaborative supervision system provides such resilience by ensuring that teacher professional development continues systematically, even when face-to-face meetings are restricted by external circumstances.

Moreover, the psychological contract between teachers and the institution is significantly improved through this transparent system. When teachers perceive that their professional growth is being tracked objectively and supported systematically, their organizational commitment increases. Klassen et al. (2013) highlight that teacher engagement is deeply tied to their psychological well-being and the structural support they receive. The MIS platform at MAN 3 Banda Aceh acts as a structural support

mechanism, providing clear pathways for professional advancement. This is particularly crucial in the context of Islamic schools, where teachers often balance heavy administrative burdens with deep spiritual and pedagogical commitments. By automating the administrative aspects of supervision, the MIS frees up cognitive and emotional bandwidth for teachers to focus on the core of their profession: nurturing student character and intellect.

However, the digitalization of the supervisory process also brings challenges that must be acknowledged. Some senior teachers initially showed resistance to technology use, requiring additional mentoring and tailored training. This underscores the importance of a human-centric approach to digital transformation; technology must serve pedagogy, not the other way around. When digital infrastructure is deliberately aligned with humanistic, collaborative pedagogical frameworks, it serves to empower the teaching workforce rather than alienate it, validating the conceptual synergy proposed by Cai et al. (2022) and Gordon et al. 2023). Additionally, reliance on digital infrastructure means that technical disruptions can interrupt the supervisory workflow. Therefore, madrasahs adopting similar models must ensure the availability of reliable technical support and have contingency plans for situations when the system is unavailable.

The practical implications of these findings are highly significant for educational administrators in madrasahs and other Islamic educational institutions. The MIS-integrated collaborative supervision model developed at MAN 3 Banda Aceh can be adapted by other madrasahs aiming to modernize their supervisory practices while retaining collaborative and humanistic values. The key to successful implementation lies in adequate training for supervisors and teachers in using the digital platform, the school leadership's commitment to supporting a collaborative culture, and system design that prioritizes transparency and ease of use. Building teacher professional capital in the contemporary era demands deeper collaboration, systemic support, and the wise utilization of technology to create a sustainable, human-centered educational ecosystem (Hargreaves & Fullan, 2020). Ultimately, the integration of MIS into collaborative supervision is not merely a technological upgrade; it is a profound cultural shift that redefines the very nature of professional learning communities within Islamic educational institutions.

3. Policy and Practical Implications

The findings of this study yield critical implications for both educational policymakers and institutional practitioners. At the policy level, the Ministry of Religious Affairs (Kementerian Agama) and regional madrasah offices should consider integrating MIS-based collaborative supervision into the national standards for

madrasah quality assurance. Current supervisory guidelines often emphasize administrative compliance; updating these frameworks to mandate developmental, data-driven collaborative supervision would significantly elevate the professional capacity of madrasah teachers nationwide. Furthermore, policy directives should allocate specific budget lines for the procurement, maintenance, and training associated with educational MIS platforms in madrasahs, ensuring that the digital divide does not exacerbate educational inequalities between urban and rural institutions.

At the practical level, madrasah principals and academic vice-principals must transition from being mere administrative managers to becoming instructional leaders who actively champion digital transformation. School leaders should prioritize the cultivation of a collaborative school culture before implementing complex technological systems; technology alone cannot fix a toxic or highly hierarchical organizational culture. Additionally, supervisors and peer coaches require specialized training not only in pedagogical observation but also in data literacy, enabling them to effectively interpret MIS analytics and facilitate meaningful, evidence-based reflective dialogues with teachers. Finally, teachers should be encouraged to take ownership of their digital portfolios, utilizing the MIS not as a tool for administrative reporting, but as a personal dashboard for continuous, self-directed professional growth.

E. CONCLUSION

The operationalization of collaborative supervision mediated by a Management Information System at MAN 3 Banda Aceh signifies a critical evolution in instructional leadership. By dismantling traditional, top-down evaluative inspections in favor of a technology-supported, collaborative framework, the institution has redefined supervision as an empowering, data-informed, and continuous developmental process. The MIS platform provides an objective, transparent foundation for reflective dialogue, enabling educators and supervisors to co-construct instructional goals, analyze empirical classroom analytics, and map individualized professional growth trajectories. Ultimately, this integrated model enhances teacher autonomy, self-efficacy, digital competence, and collaborative decision-making, while deeply resonating with Islamic educational principles of Syura and Tazkiyatun Nafs. The framework established at MAN 3 Banda Aceh provides a scalable, practical blueprint for educational policymakers and administrators seeking to modernize human resource management while preserving the humanistic, developmental core of secondary education.

Limitations of this study lie in its focus on a single urban madrasah with relatively advanced digital infrastructure; thus, findings may not be directly generalizable to rural or under-resourced madrasahs. Future research should employ mixed-methods or quantitative designs across multiple provinces to statistically model the correlations

between MIS utilization rates, teacher empowerment indices, and student academic outcomes.

REFERENCES

Abrams, L. M., Varier, D., & Mehdi, T. (2021). The intersection of school context and teachers' data use practice: Implications for an integrated approach to capacity building. *Studies in Educational Evaluation*, *69*, 100868. https://doi.org/https://doi.org/10.1016/j.stueduc.2020.100868

Ahmed, S. K. (2024). The pillars of trustworthiness in qualitative research. *Journal of Medicine, Surgery, and Public Health*, *2*(January), 100051. https://doi.org/10.1016/j.glmedi.2024.100051

AlAjmi, M. K. (2022). The impact of digital leadership on teachers' technology integration during the COVID-19 pandemic in Kuwait. *International Journal of Educational Research*, *112*(January), 1–10. https://doi.org/10.1016/j.ijer.2022.101928

Alam, S., Asmawi, A., Ullah, M., & Fatema, S. (2025). The Tetra Pillars of Trustworthiness in Qualitative Research: Equipping Early Career Researchers with a Fundamental Understanding. *Integrated Journal for Research in Arts and Humanities*, *5*(6), 73–79. https://doi.org/10.55544/ijrah.5.6.13

Asterhan, C. S. C., & Lefstein, A. (2023). The search for evidence-based features of effective teacher professional development: a critical analysis of the literature. *Professional Development in Education*, *50*(1), 11–23. https://doi.org/10.1080/19415257.2023.2283437

Asyari, S. (2020). Supervisi Kepala Madrasah Berbasis Penilaian Kinerja Sebagai Upaya Peningkatan Profesionalitas guru. *JIEMAN: Journal of Islamic Educational Management*, *1*(2), 150–163. https://www.neliti.com/publications/332300/supervisi-kepala-madrasah-berbasis-penilaian-kinerja-sebagai-upaya-peningkatan-p

Braun, V., & Clarke, V. (2020). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology*, *18*(3), 1–25. https://doi.org/10.1080/14780887.2020.1769238

Cai, Y., Wang, L., Bi, Y., & Tang, R. (2022). How Can the Professional Community Influence Teachers' Work Engagement? The Mediating Role of Teacher Self-Efficacy. *Sustainability*, *14*(10029), 1–16. https://doi.org/10.3390/su141610029

Cypress, B. S. (2017). Rigor or reliability and validity in qualitative research: Perspectives, strategies, reconceptualization, and recommendations. *Dimensions of Critical Care Nursing*, *36*(4), 253–263. https://doi.org/10.1097/DCC.0000000000000253

Diah Khoirohnissah. (2023). Digital Transformation in Indonesian Religious Education: A Case Study of Madrasah Management at Kemenag Sleman. *Journal of Islamic*

Education Management Research, *1*(2), 189–197. https://doi.org/10.14421/jiemr.2023.12-10

Fitriani, M. I., & Hakim, M. V. F. (2021). Principal Leadership Patterns in Collaborating With School Committee. *Nidhomul Haq: Jurnal Manajemen Pendidikan Islam*, *6*(1), 194–205. http://e-journal.ikhac.ac.id/index.php/nidhomulhaq

FR, A. F., Roesminingsih, E., & Sumbawati, M. S. (2021). The Leadership of School Principal in The Education Era 4.0. *Nidhomul Haq: Jurnal Manajemen Pendidikan Islam*, *6*(2), 244–250. https://e-journal.uac.ac.id/index.php/nidhomulhaq/article/view/1413?utm_source=

Fusch, P. I., & Ness, L. R. (2015). Are we there yet? Data saturation in qualitative research. *Qualitative Report*, *20*(9), 1408–1416. https://doi.org/10.46743/2160-3715/2015.2281

Gordon, D., Blundell, C., Mills, R., & Bourke, T. (2023). Teacher self-efficacy and reform: a systematic literature review. *The Australian Educational Researcher*, *50*(3), 801–821. https://doi.org/10.1007/s13384-022-00526-3

Hargreaves, A., & Fullan, M. (2020). Professional capital after the pandemic: revisiting and revising classic understandings of teachers' work. *Journal of Professional Capital and Community*, *5*(3–4), 327–336. https://doi.org/10.1108/JPCC-06-2020-0039

Harris, A., & Jones, M. (2020). COVID 19–school leadership in disruptive times. *School Leadership and Management*, *40*(4), 243–247. https://doi.org/10.1080/13632434.2020.1811479

Klassen, R. M., Yerdelen, S., & Durksen, T. L. (2013). Measuring teacher engagement: Development of the engaged teachers scale (ets). *Frontline Learning Research*, *1*(2), 33–52. https://doi.org/10.14786/flr.v1i2.44

Leithwood, K., Harris, A., & Hopkins, D. (2019). Seven strong claims about successful school leadership revisited. *School Leadership and Management*, *40*(1), 5–22. https://doi.org/10.1080/13632434.2019.1596077

Lutovac, S. (2020). How failure shapes teacher identities: Pre-service elementary school and mathematics teachers' narrated possible selves. *Teaching and Teacher Education*, *94*(103120), 1–11. https://doi.org/10.1016/j.tate.2020.103120

Maisyaroh, Budi Wiyono, B., Hardika, Valdez, A. V., Mangorsi, S. B., & Canapi, S. P. T. (2021). The implementation of instructional supervision in Indonesia and the Philippines, and its effect on the variation of teacher learning models and materials. *Cogent Education*, *8*(1). https://doi.org/10.1080/2331186X.2021.1962232

Martins, J., Branco, F., Gonçalves, R., Au-Yong-Oliveira, M., Oliveira, T., Naranjo-Zolotov, M., & Cruz-Jesus, F. (2019). Assessing the success behind the use of education management information systems in higher education. *Telematics and Informatics*, *38*, 182–193.

https://doi.org/https://doi.org/10.1016/j.tele.2018.10.001

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *International Journal of Qualitative Methods*, *16*(1), 1–13. https://doi.org/10.1177/1609406917733847

Nurjannah, E., Kuswarno, E., Mudrikah, A., & Kosasih, U. (2021). Teacher Performance Management in Improving Islamic Religious Education Lesson Learning. *Nidhomul Haq: Jurnal Manajemen Pendidikan Islam*, *6*(2), 400–412.

Sahudi, S., & Ma'arif, S. (2024). Collaborative Supervision: Increasing Teachers' Creativity in the Implementation of Multicultural-based Independent Curriculum. *Dinamika Ilmu*, *24*(1), 29–47. https://doi.org/10.21093/di.v24i1.8155

Schildkamp, K., Poortman, C. L., Ebbeler, J., & Pieters, J. M. (2019). How school leaders can build effective data teams: Five building blocks for a new wave of data-informed decision making. In *Journal of Educational Change* (Vol. 20, Issue 3). Springer Netherlands. https://doi.org/10.1007/s10833-019-09345-3

Schlunegger, M. C., Zumstein-Shaha, M., & Palm, R. (2024). Methodologic and Data-Analysis Triangulation in Case Studies: A Scoping Review. *Western Journal of Nursing Research*, *46*(8), 611–622. https://doi.org/10.1177/01939459241263011

Suryawati, E., Syafrinal, S., Harfal, Z., Muhson, A., Dianti, P. R., & Sulaiman, N. A. (2024). Mentor, Observe, Support, Take Action (MOST): a model for continuing professional development of teacher leaders. *Frontiers in Education*, *9*(June), 1–12. https://doi.org/10.3389/feduc.2024.1352577

Tian, M., & Nutbrown, G. (2023). Retheorising distributed leadership through epistemic injustice. *Educational Management Administration and Leadership*, *51*(4), 774–790. https://doi.org/10.1177/17411432211022776

Vanlommel, K., Vanhoof, J., & Van Petegem, P. (2016). Data use by teachers: the impact of motivation, decision-making style, supportive relationships and reflective capacity. *Educational Studies*, *42*(1), 1–18. https://doi.org/10.1080/03055698.2016.1148582

Yosepa, R., Komariah, A., Satori, D., & Suharto, N. (2025). Mapping the Intellectual Landscape of Collaborative Educational Supervision: A Bibliometric Review. *JMSP (Jurnal Manajemen Dan Supervisi Pendidikan)*, *9*(3), 401–413. https://doi.org/10.17977/um025v9i32025p401