Digital Supervision as a Catalyst for Teacher Professionalism: A Model for Sustainable Implementation in the Era of Educational Transformation

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Abstrac: Conventional academic supervision characterized by periodic, top-down, and spatially constrained practices confronts intensifying transformative pressures as the digitalization of education accelerates. This study departs from an observable gap between the demands of twenty-first century teacher professionalism and supervision frameworks that remain methodologically inert. Employing a Research and Development (R&D) design grounded in the ADDIE model and enriched by qualitative validation procedures, the research was conducted across four madrasahs in East Java Regency over an eight-month period. Data were obtained through in-depth interviews, participatory observation, five-point Likert-scale questionnaires, focus group discussions, and documentary analysis, subsequently analyzed via a mixed-methods strategy. The study yields three principal contributions. *First,* an empirically validated, platform-based digital supervision implementation roadmap achieving a Content Validity Index (CVI) of 0.87. *Second,* a Digital Supervisor Competency Framework (DSCF) grounded in the contextual realities of Islamic schools. *Third,* a Digital Reflective Community model fostering collaborative and self-directed teacher professional growth. Field trials revealed a 340% mean increase in supervision frequency, a rise in teacher satisfaction from 2.8 to 4.3 on a five-point scale, and a 67.3% improvement in supervisor competency scores. These outcomes carry significant theoretical and practical implications for advancing Islamic educational supervision systems in the digital era.

Keywords: Digital Supervision, Teacher Professionalism, Educational Transformation, Madrasah, Sustainable Model

Abstrak: Praktik supervisi akademik konvensional yang bersifat periodik, hierarkis, dan terbatas ruang kini menghadapi tekanan transformatif yang semakin kuat di tengah gelombang digitalisasi pendidikan yang terus berakselerasi. Penelitian ini berangkat dari kesenjangan yang nyata antara tuntutan profesionalisme guru abad ke-21 dan model supervisi yang secara metodologis masih stagnan. Dengan menggunakan desain penelitian dan pengembangan (R&D) model ADDIE yang dipadukan dengan validasi kualitatif, penelitian dilaksanakan di empat madrasah di Jaa Timur selama delapan bulan. Pengumpulan data dilakukan melalui wawancara mendalam, observasi partisipatif, angket skala Likert, focus group discussion, dan studi dokumentasi, kemudian dianalisis dengan pendekatan mixed-methods. Penelitian ini menghasilkan tiga kontribusi utama. *Pertama,* peta jalan implementasi supervisi digital berbasis platform yang tervalidasi secara empiris dengan Indeks Validitas Konten (CVI) sebesar 0,87. *Kedua,* Kerangka Kompetensi Supervisor Digital (DSCF) yang kontekstual terhadap realitas madrasah. *Ketiga,* Model Komunitas Reflektif Digital yang mendorong pertumbuhan profesional guru secara kolaboratif dan mandiri. Hasil uji lapangan menunjukkan peningkatan frekuensi supervisi rata-rata 340%, lonjakan kepuasan guru dari 2,8 menjadi 4,3 pada skala 5 poin, dan peningkatan kompetensi supervisor sebesar 67,3%. Temuan ini memberikan sumbangsih teoretis dan praktis yang signifikan bagi pengembangan sistem supervisi pendidikan Islam di era digital.

Kata Kunci: Supervisi Digital, Profesionalisme Guru, Transformasi Pendidikan, Madrasah, Model Berkelanjutan

INTRODUCTION

The sweeping digital transformation reshaping numerous domains of contemporary life has penetrated education with consequences that

extend well beyond the replacement of conventional instructional tools.[1] At its core, this transformation demands a fundamental reorientation in how practitioners conceptualize, organize, and evaluate educational practice in its entirety. Within this context, academic supervision as a central pillar of educational quality governance can no longer rest upon the foundations of a paradigm that is periodic, hierarchical, unidirectional, and constrained by the dimensions of physical space and time. The imperatives of the present era call for supervision frameworks that are genuinely adaptive, innovative, and capable of producing measurable and sustained contributions to teacher professional growth.

Conventional supervision as practiced across a significant proportion of Indonesian madrasahs including those in East Java Regency continues to be dominated by sporadic classroom visits, rigid checklist-based evaluations, and feedback that often arrives too late to retain contextual relevance. This model harbors several structural weaknesses of considerable consequence. First, the low frequency of supervisory encounters means that supervisors cannot construct a comprehensive or representative picture of teachers' daily instructional practice. Second, the hierarchical and evaluative character of conventional supervision tends to generate anxiety among teachers and suppresses the professional openness that genuine growth requires. Third, because feedback is rarely immediate,

[1] Akmalun Najmi and Ismail Ismail, "Eksplorasi Makna Hidup Anak Gen Z Di Era Digital," *Abdurrauf Journal of Education and Islamic Studies* 2, no. 1 (2025): 25–35.

it typically reaches teachers long after the relevant instructional moment has passed, substantially diminishing its formative value.[2]

Three interrelated problems were identified at the outset of this inquiry. The first is the absence of any supervisory mechanism capable of operating in a real-time and continuous fashion. As learning increasingly migrates into hybrid and fully digital environments, supervision practices that require the physical presence of a supervisor become progressively less relevant and less efficient. The second problem concerns supervisor capacity: school principals and education inspectors who are expected to supervise technology-integrated instruction frequently lack the digital competence necessary to assess that instruction meaningfully, causing them to overlook the very pedagogical-digital dimensions that are most critical. The third problem is the absence of a data-driven feedback system capable of identifying longitudinal patterns of instructional strength and developmental need, resulting in professional development plans that are generic rather than evidence-based.

A growing body of prior scholarship provides a valuable foundation for the discourse on digital supervision. Suryadi and Muharam (2022), examining the implementation of application-based supervision in senior secondary schools across West Java, found that the incorporation of digital platforms in the supervisory process substantially elevated both the

[2] Zufriyatun Zufriyatun, "Supervisi Manajerial Pengawas Madrasah Perspektif Al Qur'an Dalam Meningkatkan Mutu Madrasah Ibtidaiyah Swasta Kepulauan Riau" (Universitas PTIQ Jakarta, 2024).

frequency and quality of supervisor-teacher interactions.[3] Specifically, the use of video recordings of teaching sessions shared through digital platforms enabled supervisors to deliver feedback that was more precise, context-sensitive, and evidence-grounded than was achievable through a single, unrepeatable live observation thus opening new horizons concerning the transformative potential of digital technology in supervisory practice.

At the international level, Knight and colleagues (2021) demonstrated, through instructional coaching research conducted in the United States, that teachers receiving feedback grounded in the analysis of recorded teaching sessions exhibited significantly greater and more durable improvements in pedagogical competence than those who received only verbal feedback following direct observation.[4] This finding affirms a well-established principle of cognitive psychology: making feedback concrete through shared visual evidence engenders deeper professional reflection and more substantive behavioral change.

Muslimin and Rahayu (2023), whose focus was on supervision within the madrasah context, argued that the integration of technology into academic supervision cannot be accomplished through the mechanical adoption of digital platforms alone.[5] Equally essential is a reorientation of

[3] A. Suryadi, D., & Muharam, "Supervisi Akademik Berbasis Aplikasi Digital: Studi Implementasi Di Sekolah Menengah Atas Jawa Barat," *Jurnal Administrasi Pendidikan,* 29, no. 1 (2022): 55–71.

[4] Jim Knight et al., *The Instructional Playbook: The Missing Link for Translating Research into Practice* (ASCD, 2021).

[5] S. Muslimin, A., & Rahayu, "Integrasi Teknologi Dalam Supervisi Akademik Madrasah: Studi Kasus Transformasi Budaya Supervisi," *Jurnal Manajemen Pendidikan Islam,* 12, no. 1 (2023): 78–96.

supervisory culture moving from a paradigm of monitoring and judgment toward one of guidance and empowerment and this cultural transformation must proceed in tandem with technological adoption. Absent such a paradigm shift, digitalization risks producing nothing more than intensified digital surveillance without any corresponding growth in professional capacity.

A careful reading of these studies reveals three substantive research gaps. First, no investigation has yet comprehensively developed and empirically validated an integrated digital supervision model specifically suited to the cultural and institutional characteristics of Indonesian madrasahs. Second, existing studies tend to examine isolated supervisory components either the technological dimension or the relational dimension between supervisor and teacher without treating supervision as a coherent, interconnected system. Third, the question of the sustainability of digital supervision models how to ensure that they remain relevant, effective, and adaptive as both technology and teacher needs evolve has not received adequate scholarly attention.

Building upon this identified gap, the present study pursues three complementary objectives to develop a comprehensive, contextually grounded, and sustainable digital supervision model for madrasahs, to validate the effectiveness of that model through empirical field implementation and to formulate a digital supervisor competency framework that can serve as a benchmark for capacity development among school principals and education inspectors. Theoretically, this research aims to enrich the scholarship of educational supervision with digital

perspectives that remain underexplored in the madrasah context. Practically, the resulting model is intended to serve as an immediately applicable implementation guide for school leaders seeking to design supervision systems that are more effective, more responsive, and more consequential for teacher professional development.

RESEARCH METHODOLOGY

This study employs a Research and Development (R&D) design grounded in the ADDIE model comprising Analysis, Design, Development, Implementation, and Evaluation phases enriched by qualitative procedures during validation and evaluation. The R&D design was chosen because the study's ambition extends beyond description of phenomena to the production of a supervision model that is implementation-ready and empirically validated.[6] The ADDIE framework was selected for its systematic architecture, which supports the planned, iterative, and evaluable development of a product at each stage of its construction.

The research was conducted across four madrasahs in East Java Regency one Madrasah Ibtidaiyah, one Madrasah Tsanawiyah, and two Madrasah Aliyah with contrasting characteristics (state-operated and private) between January and August 2025. Primary data sources comprised four school principals, six Ministry of Religious Affairs education inspectors, twenty-four teachers (six per institution), and four curriculum vice-principals. Secondary data included institutional supervision program documents, existing supervision instruments,

[6] Sulastri Rini Rindrayani et al., *Metode Penelitian Dan Pengembangan: R&D Research and Development* (PT. Sonpedia Publishing Indonesia, 2025).

supervisory outcome reports, and recorded teaching sessions. Data collection employed semi-structured in-depth interviews, participatory observation, five-point Likert-scale questionnaires, focus group discussions, and documentary study.

Analysis proceeded through a mixed-methods strategy: quantitative data from questionnaires were examined descriptively to measure model validity and effectiveness, while qualitative data from interviews and observations underwent thematic analysis following the procedures articulated by Miles, Huberman, and Saldana (2014). Model validation involved two sequential stages: expert validation conducted by a panel of three educational supervision specialists and two educational technology specialists, followed by empirical validation through field trials.[7] The trustworthiness of qualitative findings was assured through source triangulation, method triangulation, and member checking.

RESULTS AND DISCUSSION

A. A Platform-Based Digital Supervision Implementation Roadmap: From Concept to Practice

The study's foremost and most foundational finding is the construction of a comprehensive, empirically validated, and contextually adaptable implementation roadmap for digital supervision.[8] This roadmap represents a synthesis of field discoveries

[7] Matthew B Miles, A Michael Huberman, and Johnny Saldana, *Qualitative Data Analysis* (sage, 2014).

[8] Ismail Ismail, "Politik Pendidikan Islam Di Daerah: Analisis Kebijakan Pemerintah Provinsi Jawa Timur Dalam Pengembangan Madrasah Diniyah [Disertasi]," *UIN Sunan Ampel Surabaya*, 2017.

during the analysis and design phases, expert panel input gathered during validation, and lessons derived from the implementation and evaluation stages. It is not intended as a rigid prescription to be followed literally, but rather as a flexible and adaptive framework that madrasahs may calibrate to their specific conditions and resources.[9]

The roadmap comprises four sequential yet potentially overlapping phases is the Readiness Phase, the Adoption Phase, the Integration Phase, and the Innovation Phase. This classification adapts Davis's (1989) Technology Adoption Model,[10] and integrates it with the principles of clinical supervision articulated by Glickman and colleagues (2018), producing a framework that addresses both technological and pedagogical dimensions simultaneously.[11]

The Readiness Phase unfolds across four to six weeks and centers on three activities: an institutional digital readiness assessment covering infrastructure, devices, and connectivity; a digital competency assessment of supervisors and teachers; and broad-based socialization to build shared understanding of the philosophy underlying the digital supervision model to be implemented. Crucially, field findings during this phase disclosed that technical preparedness availability of devices and reliable connectivity is not the primary determinant of

[9] Moh Wardi et al., "Implementation of Religious Moderation Values through Strengthening Diversity Tolerance in Madrasah," *Jurnal Pendidikan Islam* 9, no. 2 (2023): 241–54.
[10] Fred D Davis, "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *MIS Quarterly* 13, no. 3 (1989): 319–40.
[11] Carl D Glickman, Stephen P Gordon, and Jovita M Ross-Gordon, *Supervision and Instructional Leadership: A Developmental Approach* (ERIC, 2018).

implementation success. Madrasahs with limited technical resources but visionary leadership and high teacher commitment demonstrated faster implementation progress than those that were technically better equipped but lacked change-driving leadership.[12]

The Adoption Phase centers on the introduction and normalization of digital platforms in supervisory processes. Three categories of platform amenable to layered integration were identified is communication and collaboration platforms (Google Workspace for Education, Microsoft Teams): video-based observation and feedback platforms (Edpuzzle, Loom, or straightforward recording via Google Meet); and supervisory data management platforms (Google Forms for observation instruments, Sheets for data analysis, Sites for teacher digital portfolios).[13] This layered approach enables madrasahs to begin with the most familiar and accessible tools, progressively extending the sophistication and complexity of the digital ecosystem as institutional capacity grows.

Among the phase's most significant findings was the effectiveness of a video-based instructional supervision model. In this approach, teachers record their teaching sessions with or without the supervisor physically present using available devices such as smartphones, tablets, or laptops. Recordings are then shared with the supervisor through a

[12] Ismail Ismail, "Madrasah Diniyah Dalam Multi Perspektif," *Kabillah: Journal of Social Community* 2, no. 2 (2017): 254–82.
[13] Moh Wardi et al., "Digital Transformation of Islamic Boarding School Financial System; Formulation, Implementation and Evaluation," *Munaddhomah: Jurnal Manajemen Pendidikan Islam* 5, no. 4 (2024): 461–82.

secure and privacy-protected platform. The supervisor conducts a thorough analysis of the recording, identifies patterns of strength and areas requiring development, and then provides feedback through a combination of written annotations tied to specific video timestamps and a synchronous reflective discussion session conducted via video call.

The advantages of this model over conventional observation are substantial and measurable. First, supervisors can analyze a teaching recording as many times as necessary and replay particular segments that merit deeper scrutiny something fundamentally impossible during a one-time, non-repeatable live observation. Second, teachers have the opportunity to watch their own teaching sessions before the feedback meeting, arriving at the discussion having already undertaken a more mature phase of self-reflection. Third, teaching recordings can become part of a teacher's digital professional portfolio, documenting the trajectory of their growth over time. Knight and colleagues (2021) affirm that video-based feedback produces instructional behavioral changes that are three times more significant than verbal feedback alone, because it furnishes concrete, contestable evidence and facilitates deep collaborative reflection between supervisor and teacher.[14]

The Integration Phase marks the point at which digital supervision begins to function as an organic constituent of the madrasah's professional rhythms rather than as a special program demanding

[14] Knight et al., *The Instructional Playbook: The Missing Link for Translating Research into Practice*.

extraordinary effort. At this stage, data from supervisory processes are integrated into teacher performance management systems, professional development planning, and curriculum review.[15] A digital dashboard developed during this research enables school principals to monitor supervisory patterns in aggregate: which teachers have received the greatest number of supervisory sessions, which pedagogical competencies have most frequently been the focus of development, and how the overall trajectory of teacher professional growth has evolved over time.

The Innovation Phase represents the roadmap's apex, at which madrasahs begin generating local adaptations and innovations upon the digital supervision model they have implemented. Here, teachers who have attained high levels of digital competence begin functioning as co-supervisors or peer supervisors offering video-based feedback to colleagues within a horizontal supervisory structure facilitated by the school principal. This practice, described in the literature as peer coaching.[16] has proven highly effective in expanding the reach of supervisory impact without proportionally increasing the workload of a single designated supervisor.

Expert panel validation of the model yielded a Content Validity Index (CVI) of 0.87, exceeding the established minimum threshold of

[15] Siti Nuri Nurhaidah and Nabila Lubis, "The Role of Cyber-Creation in Da'wah for the Development of Urban Muslim Communities," *Hayula: Indonesian Journal of Multidisciplinary Islamic Studies* 9, no. 2 (2025): 259–80.

[16] S. Zwart, R. C., Wubbels, T., Bergen, T. C. M., & Bolhuis, "Experienced Teacher Learning within the Context of Reciprocal Peer Coaching," *Teachers and Teaching,* 25, no. 1 (2019): 77–98.

0.80 and confirming that the implementation roadmap possesses high content validity. Field trials demonstrated that after four months of implementation, supervision frequency increased by a mean of 340% from an average of 1.2 sessions per semester to 5.3 and teacher satisfaction with the quality of feedback received rose from a mean score of 2.8 to 4.3 on a five-point scale.

B. A Digital Supervisor Competency Framework: Redefining Roles and Capacities

The study's second major finding is the development of a comprehensive and contextually grounded Digital Supervisor Competency Framework (DSCF). This framework emerged from a pressing practical need: school principals and education inspectors who are called upon to supervise digital instruction frequently find themselves in a paradoxical position expected to guide teachers in integrating technology into their pedagogy while themselves lacking adequate understanding of or proficiency with that technology.

The DSCF developed in this study integrates three complementary theoretical frameworks: the European Framework for the Digital Competence of Educators (DigCompEdu),[17] the supervisor competency framework,[18] and the data-driven instructional leadership principles articulated.[19] The synthesis of these frameworks produces five principal

[17] Christine Redecker, *European Framework for the Digital Competence of Educators: DigCompEdu*, 2017.
[18] James F Nolan and Linda A Hoover, *Teacher Supervision & Evaluation: Theory into Practice*, *Wiley*, 2018.
[19] Victoria L Bernhardt, *Data Analysis for Continuous School Improvement* (Routledge, 2018).

competency domains that effective digital supervisors in the madrasah context must master.[20]

The first domain is functional digital literacy the supervisor's capacity to operate the diverse digital platforms and tools relevant to supervision, from video conferencing systems to learning management platforms. Despite appearing elementary, field evidence revealed that this domain constitutes the most frequently encountered obstacle for school principals seeking to implement digital supervision.[21] The capacity-building program designed within this research included an intensive forty-hour training sequence focused on direct, simulated application of key platforms in authentic supervisory scenarios.

The second domain is digital pedagogical competence the supervisor's ability to understand the pedagogical principles underlying digital learning and to deploy those principles as an analytical framework during supervisory processes. Supervisors who are technically literate but lack digital pedagogical understanding tend to offer feedback concentrated on the technical mechanics of tool use whether the teacher correctly operates the platform rather than on the more essential pedagogical question of whether technology deployment actually enhances learning quality and student understanding. Mishra and Koehler's (2019) Technological Pedagogical Content Knowledge

[20] Muslimin, A., & Rahayu, "Integrasi Teknologi Dalam Supervisi Akademik Madrasah: Studi Kasus Transformasi Budaya Supervisi."
[21] Zufriyatun, "Supervisi Manajerial Pengawas Madrasah Perspektif Al Qur'an Dalam Meningkatkan Mutu Madrasah Ibtidaiyah Swasta Kepulauan Riau."

(TPACK) framework is embedded within this domain as the conceptual lens supervisors use to analyze teachers' digital instructional practices.[22]

The third domain is data-driven analytical competence the supervisor's capacity to gather, organize, interpret, and communicate data regarding teachers' instructional practices from multiple digital sources. In the age of digital supervision, information about teaching is available in numerous forms: learning analytics from platforms (task completion rates, time-on-task, quiz scores), recorded teaching sessions, teacher digital portfolios, and student feedback collected digitally. Supervisors who are analytically competent can synthesize data from these sources into a comprehensive portrait of instructional practice and deploy it as the foundation of meaningful reflective dialogue.

The fourth domain is digital coaching competence the supervisor's ability to cultivate a productive and supportive professional relationship through digital media. Zwart and colleagues (2019) affirm that the quality of the supervisor-teacher relationship is the strongest predictor of supervisory effectiveness, surpassing even the quality of the supervisory instruments employed.[23] In digital contexts, constructing relationships that are genuinely warm and supportive through a screen without the physical presence that enables rich non-verbal communication is a distinct skill requiring deliberate development.

[22] Punya Mishra and Matthew J Koehler, "Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge," *Teachers College Record* 108, no. 6 (2019): 1017–54.
[23] Zwart, R. C., Wubbels, T., Bergen, T. C. M., & Bolhuis, "Experienced Teacher Learning within the Context of Reciprocal Peer Coaching."

Effective digital supervisors must master techniques of empathic communication through text, audio, and video, and must learn to read signals of discomfort or resistance as they are mediated through technology.[24]

The fifth domain is digital change leadership competence the supervisor's ability to lead the cultural transformation of the madrasah's supervisory paradigm from surveillance toward empowerment, and to sustain that transformational momentum in the face of institutional inertia and resistance. This domain integrates transformational leadership principles with an understanding of organizational dynamics during the adoption of digital innovation. Supervisors who excel in this domain are capable of constructing compelling narratives about the necessity of digital supervision, building coalitions of change advocates from within the madrasah community, and consistently celebrating incremental achievements that accumulate into substantive transformation.

Effectiveness testing of the DSCF through the forty-hour training program yielded promising results. Pre-test and post-test administration of the digital supervisor competency assessment instrument developed within this research showed a mean score improvement of 67.3% from an average score of 41.2 to 68.9 on a 100-point scale. More importantly, observation of actual supervisory

[24] Akmalun Najmi and Abd Fattah, "IMPLEMENTASI PEMANFAATAN TEKNOLOGI DALAM PENDIKAN FORMAL DI PESANTREN (STUDY KASUS DI SMP MATHLAUL ULUM TAMBUKO SUMENEP)," *As-Sulthan Journal of Education* 1, no. 4 (2025): 816–22.

practice following the training revealed significant qualitative change: supervisors began posing deeper reflective questions, made more consistent use of concrete data in supervisory conversations, and more frequently adopted a coaching rather than an evaluative posture.

A contextual dimension demanding particular attention in the DSCF is the competency of integrating Islamic values into digital supervision. In madrasahs, supervision extends beyond the enhancement of technical-pedagogical competence to encompass the preservation and reinforcement of Islamic character within instructional processes. Effective digital supervisors in this setting must be capable of analyzing how teachers integrate Islamic values into digitally-mediated learning determining whether technology is being used in ways that strengthen or inadvertently erode the Islamic dimensions of instruction. This represents the distinctive contextual contribution of the DSCF, differentiating it from digital supervisor competency frameworks developed for general educational contexts.

C. The Digital Reflective Community Model: Building a Self-Sustaining Professional Growth Ecosystem

The study's third and most innovative finding is the development of the Digital Reflective Community (DRC) model a teacher professional growth ecosystem grounded in collaborative reflection, horizontal peer learning, and the strategic deployment of digital technology as both medium and catalyst for professional development.[25] The DRC model

[25] H Susilo Surahman et al., *Kompetensi Guru Di Era Digital: Menjadi Pendidik Cakap Teknologi Dan Inovatif* (Penerbit Kbm Indonesia, 2025).

arose from the observation that the most meaningful supervision occurs not in formal observation-and-feedback encounters between supervisor and teacher, but in the continuous informal conversations through which teachers collectively examine their practice, share challenges, and search for solutions together.

The DRC as developed in this research is structured across three mutually integrated layers. The first is Individual Digital Reflection the practice of teachers independently recording, watching, and analyzing their own teaching sessions using a structured reflection guide developed within the study. This guide directs teachers to examine their practice from four perspectives: effectiveness of content delivery, quality of student engagement, pedagogical alignment with learning objectives, and integration of Islamic values within the madrasah context. Individual reflections are subsequently synthesized in a digital reflective journal, systematically documented as a component of each teacher's professional portfolio.[26]

The second layer is Collegial Digital Reflection the practice of teachers sharing their teaching recordings or summaries of individual reflections with a small collegial group of three to five peers to obtain external perspectives and peer feedback. Collegial reflection sessions operate on a hybrid basis: weekly synchronous sessions of forty-five to sixty minutes conducted via video call, supplemented by asynchronous communication through digital collaboration platforms for the

[26] Ismail Ismail and Moh Wardi Moh Wardi, "Transforming Elementary School Students' Science Literacy through Scratch-Based E-Modules Integrated with Islamic Value," *International Journal of Elementary Education* 9, no. 2 (2025): 237–47.

exchange of resources, commentary, and mutual support between sessions. The collegial reflection protocol developed in this study adapted from the Consultancy Protocol of the School Reform Initiative.[27] Ensures that sessions proceed productively, remain structured, and stay oriented toward growth rather than judgment.

The third layer is Community Digital Reflection a broader forum in which all teachers of the madrasah convene virtually or in hybrid mode to share exemplary practice, discuss systemic challenges, and collectively chart the direction of the community's professional development. This forum convenes monthly and is designed as a convergence of a showcase in which teachers present digital instructional innovations they have trialed and a learning laboratory in which teachers collaboratively experiment with new pedagogical approaches or digital tools. The school principal functions as facilitator and rhythm-keeper, not as evaluator or singular authority.

The foundational principle of the DRC is what this study terms Reflective Digital Dialogue (RDD) reflective conversation mediated by digital technology and anchored to concrete artifacts from actual instructional practice. RDD is distinguished from ordinary professional discussion in several defining respects: it is invariably grounded in concrete artifacts (video recordings, learning analytics, student work, or lesson planning documents); it follows a mutually agreed-upon protocol ensuring both openness and depth of reflection; it documents its

[27] Zwart, R. C., Wubbels, T., Bergen, T. C. M., & Bolhuis, "Experienced Teacher Learning within the Context of Reciprocal Peer Coaching."

outcomes digitally for future reference; and it always concludes with a commitment to concrete action that can be evaluated in the subsequent session.

Implementation of the DRC model across the four participating madrasahs generated rich and varied dynamics. In the first Madrasah Aliyah, the DRC evolved into an exceptionally active and productive community in which teachers spontaneously initiated additional reflection sessions beyond the scheduled programme. In the Madrasah Ibtidaiyah, the DRC encountered significant initial resistance from several senior teachers who experienced the practice of recording their lessons as intrusive surveillance rather than professional support.[28] This obstacle was addressed by modifying the approach: teachers were granted full control over who could access their recordings only themselves, a small peer group, or the wider community so that video recording came to be understood as a self-reflection tool rather than a monitoring document.

From the perspective of Vygotsky's social learning theory, the DRC can be understood as an implementation of the Zone of Proximal Development (ZPD) within the professional context one in which each teacher grows beyond the boundaries of their current capacity through interaction with peers who possess complementary competencies, facilitated by digital artifacts that enrich reflective conversation. Each teacher brings a unique perspective that deepens the community's

[28] Glickman, Gordon, and Ross-Gordon, *Supervision and Instructional Leadership: A Developmental Approach*.

collective understanding: younger, more digitally fluent teachers contribute technical facility and pedagogical creativity, while senior teachers offer the depth of content understanding and pedagogical wisdom accumulated across years of practice.[29]

The effectiveness of the DRC model is evidenced through several indicators. The Teacher Self-Reflection Inventory (TSRI), administered at the beginning and end of implementation, revealed a mean improvement of 58.4% in reflection quality advancing from the 'descriptive' to the 'critical-evaluative' level on the rubric developed within this study. Classroom observation data showed improvements across four key indicators: variety of teaching strategies, quality of teacher questioning, level of active student engagement, and integration of formative assessment. A teacher satisfaction survey found that 91.7% of teachers reported that the DRC had a significantly positive effect on their professional development considerably higher than the 64.3% who expressed appreciation for conventional training programs.

The sustainability of the DRC model received particular attention in the design of this study. Unlike conventional supervision programs whose continuity depends heavily on the presence and initiative of a single designated supervisor, the DRC is designed to persist and develop autonomously even through changes in key personnel. Three mechanisms enable this: shared ownership each community member feels a sense of personal responsibility for and investment in the

[29] Muslimin, A., & Rahayu, "Integrasi Teknologi Dalam Supervisi Akademik Madrasah: Studi Kasus Transformasi Budaya Supervisi."

community, not merely passive participation; digital knowledge codification the wisdom and learning generated by the community is documented on digital platforms so that it is not lost with the departure of particular individuals; and a system of internal leadership regeneration in which facilitation responsibility rotates periodically among members, distributing leadership capacity evenly across the community.

The synthesis of all three findings produces an integrated digital supervision model that this study designates SIPROS-D (Sistem Supervisi Profesional Digital, Digital Professional Supervision System). SIPROS-D reconceptualizes supervision not as an activity performed by a supervisor upon a teacher, but as an ecosystem that enables professional growth to occur in multiple directions, grounded in evidence, and sustained over time. Within this ecosystem, the implementation roadmap provides structure and direction; the supervisor competency framework supplies the requisite leadership capacity; and the DRC model creates the social and cultural conditions that allow professional growth to emerge organically and continuously, far beyond the limitations of formal supervisory encounters.

CONCLUSION

This study successfully developed and validated an integrated digital supervision model SIPROS-D comprising three mutually reinforcing components: a platform-based implementation roadmap, a digital supervisor competency framework, and a digital reflective community model. Together, these components constitute a supervisory ecosystem that

not only harnesses digital technology as an instrument, but transforms it into a catalyst for the renewal of professional culture in the madrasah from a culture of monitoring to a culture of empowerment, from individual to collective reflection, and from episodic to continuous professional growth. Empirical testing produced significant and measurable improvements across all designated indicators of supervisory quality and teacher professionalism.

The implications of these findings operate at multiple levels. For practitioners, SIPROS-D offers implementation guidance that can be directly adapted to the specific context of any madrasah. For policymakers within the Ministry of Religious Affairs, the findings call for a regulatory reorientation that explicitly recognizes and promotes digital supervision models as legitimate and effective alternatives to conventional approaches. For academic researchers, this study opens a stimulating agenda for future inquiry: how might the SIPROS-D model be adapted across educational levels, how can its long-term effects on student learning outcomes be rigorously measured, and how might artificial intelligence be integrated into supervisory data analytics in the years ahead.

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