

The Adaptation of Islamic Religious Education Teachers in Utilizing Digital Platforms for Learning Assessment in State Islamic Senior High Schools

Ansorul Alim*, Suwadi

Sunan Kalijaga State Islamic University, Indonesia

* 25204011001@student.uin-suka.ac.id (Primary Contact)

ABSTRACT

This study analyzes the adaptation of Islamic Education (PAI) teachers in utilizing digital platforms for assessment at MAN 1 Kulon Progo. Employing a qualitative case study approach, data were collected through interviews with 4 participants (including PAI teachers and the Head of Madrasah), observations, and documentation. The findings reveal that teachers implemented a hybrid strategy: Jogja Madrasah Digital (JMD) for summative assessments and Quizizz/Kahoot for formative assessments. This process was supported by intensive leadership training and adequate laboratory infrastructure, which reduced technological resistance among senior teachers. In addressing connectivity issues and the digital equity challenges faced by boarding school students, teachers demonstrated adaptive expertise through the utilization of laboratory facilities. Theoretically, the study identifies a strong TPACK synthesis in transforming religious content into Higher-Order Thinking Skills (HOTS)-based assessment instruments. Although efficiency improved, affective assessment remains a challenge in digital automation. The success of this adaptation reflects the synergy between teacher agency, instructional leadership, and infrastructure, with recommendations for developing digital affective assessment rubrics that are more sensitive to spiritual and moral values.

Keywords

Assessment
Evaluation; Digital
Ecosystem; Islamic
Education Teachers;
TPACK; Technology
Adaptation

Article History

Received: 2026-06-05
Accepted: 2026-07-23

Copyright © 2026, Alim et al.
Published by MAN 4 Kota Pekanbaru
DOI: [10.56113/takuana.v5i2.551](https://doi.org/10.56113/takuana.v5i2.551)

1. INTRODUCTION

Digital transformation has become an inevitability that permeates all aspects of life, including the education sector. The paradigm shift from conventional methods to a technology-based learning ecosystem demands rapid adaptation from all stakeholders, especially teachers as the vanguard of the teaching and learning process. The integration of technology does not stop at the material delivery process but also extends to the evaluation aspect. Learning assessment, initially synonymous with paper and pencil, has now transformed into a digital format that offers efficiency, flexibility, and data richness. Various digital platforms such as Google Forms, Quizizz, Kahoot!, to madrasah Learning

Management Systems (LMS) like E-Learning Madrasah, emerge as instruments with the potential to revolutionize how teachers measure and analyze student competency achievements (Nurhayati et al., 2025). However, contemporary research reveals a significant gap between the adoption of digital learning methods and the implementation of digital assessments, indicating that transformation in the evaluation domain is proceeding slower than innovations in the instructional domain (Karunaratne et al., 2025).

Amidst this massive current of digitalization, Islamic Religious Education (IRE) as a subject that aims not only to transfer knowledge (cognitive) but also to shape attitudes (affective) and worship skills (psychomotor), faces unique challenges in the digital assessment process. IRE learning is essentially a process of value internalization that impacts students' attitudes and behaviors, meaning its evaluation needs to comprehensively cover these three domains (Zamzami, 2025). IRE teachers are required to be capable of designing digital-based assessment instruments that remain authentic in measuring these dimensions. The main problem that arises is not merely the technical ability to operate platforms, but rather how to translate the essence of spiritual and moral assessment into measurable digital rubrics and formats without reducing their complexity. This gap is increasingly apparent because the traditional assessments used thus far often fail to measure students' abilities to analyze, evaluate, and apply religious teachings in real-life contexts (Kurnaengsih, 2025). Herein lies the urgency for the pedagogical and technological adaptation that must be undertaken by IRE teachers.

The Technological Pedagogical Content Knowledge (TPACK) framework developed by Mishra & Koehler (2006) explains that a teacher's competence in integrating technology does not solely rely on the mastery of technical devices, but rather on the synergistic combination of technological, pedagogical, and content knowledge. In the context of IRE, the TPACK framework requires teachers to align the use of digital platforms with Islamic pedagogical values and the religious teachings that form the substance of learning. Adiyono et al. (2025), in their case study at an Indonesian Islamic higher education institution, found that LMS-based assessments grounded in ethical principles and faith values can foster transparency, academic honesty, and students' moral engagement, aligning with Islamic principles such as *amanah* (trustworthiness) and *'adl* (justice). These findings strengthen the argument that TPACK integration in IRE assessment is not merely technical-procedural but also involves a distinct spiritual dimension. Nevertheless, the implementation of the TPACK framework in the field still faces obstacles, particularly in developing digital assessment instruments that can authentically represent pedagogical content knowledge integrated with technology (Küng & Brovelli, 2025).

The reality in the field shows that teachers generally still face significant challenges in adapting to educational technology. Azizi et al. (2024) identified low digital literacy and low motivation as the main factors hindering teachers' adaptation to the digital learning ecosystem. In the madrasah context, these barriers can become increasingly complex. Sholikah (2025), in her research at a State Islamic Senior High School in East Java, found that alongside digital literacy issues among educational staff, there is also the risk of technology misuse by students, requiring special attention in assessment design. These various empirical findings affirm that the adaptation of teachers, specifically IRE teachers, in utilizing digital platforms is not a simple process; it demands continuous negotiation between technological demands, the characteristics of religious content, and appropriate pedagogical design.

State Islamic Senior High School (MAN) 1 Kulon Progo, as one of the prominent Islamic educational institutions in the Special Region of Yogyakarta, has institutionally demonstrated a strong commitment to innovation and technology integration. The madrasah environment, already accustomed to a digital culture, creates a conducive ecosystem while simultaneously demanding teachers, including IRE teachers, to continuously improve their competencies. Digitalization in madrasahs has proven to yield positive impacts, such as expanding learning access and operational efficiency, as demonstrated in a study at a pesantren-based Islamic senior high school in Kudus (Azka, 2025). Nonetheless, existing literature has not extensively explored in-depth how IRE teachers in madrasahs with established digital ecosystems like MAN 1 Kulon Progo navigate the adaptation process in assessments, which possess distinctive characteristics as they involve measuring attitudinal and spiritual competencies. This is the knowledge gap that this research intends to fill.

This adaptation phenomenon is crucial to examine because its success will significantly determine the quality of IRE learning outputs. Do digital platforms merely serve as substitution tools replacing paper, or are they truly utilized transformatively to create more in-depth, reflective, and personalized assessments? Based on this background, this research aims to comprehensively explore and describe the processes, strategies, and challenges faced by IRE teachers in adapting and utilizing digital platforms for learning assessments within the MAN 1 Kulon Progo environment. As a scientific contribution, the findings of this research are expected to offer an empirical framework regarding the synthesis of TPACK in designing assessments that do not solely focus on the cognitive domain but also authentically facilitate the evaluation of affective and spiritual domains, thereby enriching the literature on the development of digital pedagogy studies in religious education.

2. METHOD

This research employs a qualitative approach with a descriptive case study design to explore the adaptation phenomenon of IRE teachers in utilizing digital platforms for learning assessments. The selection of this design is based on Creswell (2009) argument that a case study is highly effective for thoroughly understanding human or social issues within a bounded real-life context. The research location was designated at MAN 1 Kulon Progo, Yogyakarta, selected purposively due to its status as an Islamic educational institution that already possesses a conducive digital culture ecosystem. The primary research subjects involved [e.g., 4] IRE teachers and the Head of the Madrasah. The selection of informants was conducted using a purposive sampling technique with the following criteria: (1) teachers who teach IRE at MAN 1 Kulon Progo, and (2) teachers who actively integrate the TPACK framework in their digital evaluation practices. Participant characteristics vary in terms of age and length of work experience, allowing researchers to map the dynamics of cross-generational technology adaptation, including mitigation strategies by both senior and junior teachers.

Data was collected intensively in a single day of implementation on April 28, 2025, through a comprehensive series of techniques, including interviews, observation, and documentation. The observation was directly focused on the execution moment of digital assessments in the classroom to capture the teachers' actual practices. Meanwhile, semi-structured interviews were conducted on the same day outside of Teaching and Learning

Activities hours to explore teachers' perspectives on the challenges of translating the essence of spiritual and moral assessment into digital formats without reducing their complexity.

Data analysis was conducted circularly and continuously following the interactive model developed by Miles et al. (2014). The analysis stages began with data condensation, where researchers sorted and summarized field data relevant to the focus of the pedagogical and technological adaptation of IRE teachers. As a technical coding example, interview excerpts regarding the use of the JMD platform were classified into the theme 'Summative Assessment Strategies', while the use of Quizizz was coded as 'Formative Assessment Gamification'. Furthermore, observational data regarding the use of computer laboratories to ensure equitable digital access for students were formulated into the theme 'Digital Equity Mitigation'. Subsequently, the data were presented systematically in a descriptive narrative format to map out the emerging patterns of adaptation strategies. The final stage was drawing conclusions and verification, where initial findings were re-tested for robustness through discussions and relevant literature reviews to ensure the drawn conclusions had a strong empirical foundation and were capable of filling the existing knowledge gap.

3. RESULTS AND DISCUSSION

3.1. Digital Ecosystem in Madrasah Assessment: The Integration of JMD and the Diversity of Interactive Platforms

The digital ecosystem at MAN 1 Kulon Progo in the context of learning assessment has reached an established level of integration through the use of the Jogja Madrasah Digital (JMD) platform as the primary, formal, and systematic evaluation instrument. This platform is a paid program from the Regional Office (Kanwil) that has been adopted as the centralized assessment standard within the madrasah environment. JMD does not merely function as a medium for distributing test questions, but rather as a comprehensive evaluation data processing engine capable of providing instant scoring results, automatic ranking, and systematic analysis of question difficulty levels. As expressed by the Head of the Madrasah:

"Here, the assessment uses JMD, Jogja Media Digital. It is a paid platform... Later, we upload the questions there, and then the students just have to do them. The scores will come out there right away. Once the scores are out, they can be directly analyzed by the system as well. [It analyzes whether] the questions are at an intermediate, moderate, or difficult level."

Although JMD serves as the mandatory instrument for mid-semester and final examinations, IRE teachers demonstrate high adaptability by combining this platform with various other interactive applications such as Kahoot, Quizizz, and Jogja Belajar for daily assessments. The utilization of these platforms aims to maintain student engagement so that the daily evaluation process becomes more interesting and less monotonous. An *Akidah Akhlak* (Islamic Theology and Morals) teacher explained the practice of using these supporting instruments:

"Usually for daily quizzes... or perhaps for supplementary materials, to introduce exam questions, it is typically done through that, through Quizizz."

The findings regarding the use of these interactive platforms are reinforced by the researcher's observation notes in the field. During observations of daily quizzes in IRE

classes, the researcher noted high student enthusiasm when answering questions through the Quizizz platform compared to conventional methods. The teacher was able to directly monitor students' progress through the projector screen, provide instant feedback, and view the score leaderboard, which triggered a positive competitive atmosphere. Furthermore, teachers were also seen to be capable of integrating interactive quizzes like Kahoot as effective educational interludes to rapidly measure student understanding at the end of a learning session.

Theoretically, the diversity in the use of these platforms reflects the mastery of Technological Pedagogical Knowledge (TPK) within the TPACK framework. IRE teachers do not only possess the technical knowledge (Technological Knowledge) to operate various digital applications, but also the pedagogical capability to differentiate the functions of technological tools according to their objectives. JMD is utilized to meet the needs for administrative accuracy and validity (summative), while platforms like Quizizz and Kahoot are used to increase student interaction and emotional engagement in the learning process (formative). This adaptation indicates that technology integration at MAN 1 Kulon Progo has reached a transformation stage of assessment strategies that are efficient, varied, and based on students' needs.

The findings regarding the platform integration practices at MAN 1 Kulon Progo provide a new perspective on the discourse of digital assessment. While Karunaratne et al. (2025) found that digital assessment innovation often proceeds slower and lags behind instructional learning due to low adaptability, the practices in this madrasah prove the opposite. The success of IRE teachers in combining the formal-standardized JMD with the dynamic Quizizz and Kahoot confirms the thesis of Hariyanto & Tiofani (2025) that gamification in formative assessment can enhance interaction and reduce students' evaluative anxiety. Moreover, the orchestration of these hybrid platforms asserts that IRE teachers do not experience technological 'stuttering', a barrier often identified in the study by Azizi et al. (2024). This practice aligns with the conceptual framework of Nurhayati et al. (2025), wherein teachers act as instructional designers who critically select digital instruments not merely to transfer questions onto a screen, but rather tailor them to the cognitive and affective mapping needs of the students.

3.2. The Adaptation Process of IRE Teachers through Capacity Building and Institutional Support

The adaptation process of IRE teachers at MAN 1 Kulon Progo in utilizing assessment technology is the result of synergy between instructional leadership and massive infrastructure availability. The role of the Head of the Madrasah becomes highly central in facilitating this transition through repetitive training mechanisms conducted whenever a new platform innovation emerges. The training materials focus on practical aspects, ranging from account creation simulations and how to upload test instruments, to techniques for interpreting student achievement analysis data within the system. This policy ensures that teachers are not left to undertake aimless independent exploration, but are instead guided tactically. As explained by the Head of the Madrasah:

"Whenever there is a new digital task, we always train first, we practice. For example, when Quizizz and Kahoot emerged, we held a training; we have also trained on JMD... for instance, showing this is how to analyze it, this is how to use it (demonstrated)."

These capacity-building efforts directly correlate with the development of the Technological Knowledge (TK) component within the TPACK framework (Koehler et al., 2013). Repetitive training enables teachers to build technical self-confidence, so that motivational barriers, often identified as the primary constraint to adaptation, can be minimized.

In addition to capacity building through training, tangible support in the form of hardware provision acts as a determinant factor accelerating the adaptation process. The madrasah made a significant investment by providing 30 high-specification computer/laptop units with 16GB of RAM. This support ensures that no teacher is hindered by the lack of personal devices; thus, it is currently recorded that 100% of the teachers have access to laptops in carrying out their professional duties. This finding is supported by the researcher's observation notes indicating routine activities in the teachers' room, where all IRE teachers actively work using their respective laptops to process grading data and formulate assessment instruments. This established infrastructure readiness provides a crucial contrast to previous studies such as Sholikah (2025); whereas in that study, device limitations were a major barrier, at MAN 1 Kulon Progo, the elimination of such physical barriers shifts the adaptation focus toward feature optimization and content creativity.

This adaptation dynamic also touches upon the senior teacher group, who sociologically are often perceived to have a higher resistance to technology. Field data indicate that in the initial phase, there were indeed several teachers who experienced difficulties and tended to rely on the assistance of other teachers. However, through habituation programs and systemic demands where all performance appraisal administration is now conducted digitally, these obstacles have been successfully overcome. The Head of the Madrasah reported that through digital habituation, there are currently almost no teachers who experience significant difficulties in operating digital assessment instruments. This aligns with the principles of the Technology Acceptance Model (TAM) by Davis (1989), where Perceived Ease of Use increases significantly when supported by intensive training and a work environment that mandates functional technology usage.

3.3. Mitigation Dynamics: Teacher Orchestration in Navigating Digital Contingencies

The adaptation of IRE teachers at MAN 1 Kulon Progo in the implementation of digital assessments demonstrates structured classroom management capacity. The concept of classroom orchestration, as explained by Dillenbourg (2013), refers to the teacher's ability to manage various technical and pedagogical constraints in real-time within a complex classroom ecosystem. In this context, the primary challenge that arises is the variability of students' internet connectivity, who use various service providers with uneven signal stability. Teachers respond to this situation through an access redundancy strategy, namely instructing students to prepare independent data packages as an anticipatory measure if the madrasah's Wi-Fi network experiences a performance drop due to massive traffic loads. This response reflects teacher agency from the ecological perspective of Priestley et al. (2026), where empirically, this agency manifests when teachers do not act passively or merely leave network issues to the madrasah institution, but rather proactively take the initiative to resolve them in the classroom. The instruction to use independent data packages is a manifestation of IRE teachers' autonomy as key actors capable of making tactical on-the-spot decisions. This action ensures that control over the continuity of the

evaluation process remains in the hands of the teacher, allowing the assessment to proceed beyond extrinsic technical barriers.

The digital resilience of teachers in this assessment process is supported by a distributed technical support model involving the roles of madrasah proctors and admins. This synergy functions to overcome operational barriers such as exam session disruptions or student login failures due to signal fluctuations. As revealed in the interview data:

“But we already have the proctor here, there is an admin. Later, we report to the admin if, for example, someone is suddenly logged out in the middle [of the exam]. Then the admin will handle it, and it can be turned back on.”

The presence of these proctors and admins establishes an essential collaborative framework within the madrasah’s digital ecosystem. Responsive technical support contributes to reducing teachers’ cognitive load when managing the class, allowing teachers to focus more attention on the pedagogical aspects of evaluation (Li & Wang, 2021).

A finding that distinguishes the practices at MAN 1 Kulon Progo is the effort to maintain digital equity through the utilization of infrastructure as a safety net for students with facility limitations. IRE teachers demonstrate flexibility by shifting the assessment mode to the computer laboratory for students who do not own mobile devices or students from Islamic boarding schools (*pesantren*) who are prohibited from bringing mobile phones. The availability of the computer laboratory and the procurement of 30 laptop units with adequate specifications by the principal serve as crucial instruments guaranteeing assessment inclusivity. This shifting strategy is a form of adaptive expertise, which is the teacher’s ability to modify standard procedures (mobile-based exams) into alternative procedures (laboratory-based exams) to ensure fairness for all students (Hatano & Inagaki, 1984; Salmon & Kelly, 2014).

Thus, the mitigation of technical constraints carried out by IRE teachers in this madrasah is both technical-procedural and pedagogical in nature. Teachers successfully align the demands of digitalization with the students’ sociological realities, such as *pesantren* regulations, supported by the availability of adequate laboratory facilities. This practice indicates that in schools with sufficient infrastructure, connectivity and device challenges can be managed through responsive facility management and teacher initiatives in maintaining the integrity of the digital evaluation process.

3.4. TPACK Synthesis in the Transformation of Islamic Religious Education Assessment

Technological adaptation in assessment practices at MAN 1 Kulon Progo reflects a complex integration between TPACK mediated by institutional policies. The TPACK framework by Koehler et al. (2013) provides an analytical lens to understand how IRE teachers combine these three knowledge domains in designing and implementing digital assessments. The manifestation of Technological Content Knowledge (TCK) is evident in the ability of IRE teachers to transform normative religious materials into measurable digital instruments. The implementation of the Jogja Madrasah Digital (JMD) platform does not merely serve as a medium for transferring questions but as a content collaboration space through the question bank import feature across madrasahs, which enriches evaluation varieties (Kementerian Agama DIY, 2026).

A shift in question orientation from rote memorization to Higher Order Thinking Skills (HOTS) is also observed, where teachers construct case narrative-based stimuli before addressing the essence of *Fiqh* (Islamic Jurisprudence) rulings or *Akidah Akhlak* (Theology and Morals) values. This practice aligns with the findings Jamilah & Agustin (2025), which indicate that HOTS integration in *Fiqh* assessments at Islamic senior high schools encourages students to think analytically and contextually, even though teachers still face capacity limitations in developing HOTS instruments. Therefore, TCK adaptation enables teachers to preserve the essence of IRE materials without reducing their depth when converted into a digital format. This finding dialogues with the thesis of Karunaratne et al. (2025), which indicates that innovation in the digital evaluation domain often proceeds slower than innovation in the instructional domain; at MAN 1 Kulon Progo, IRE teachers actually demonstrate progress in bridging this gap through content development that is adaptive to digital mediums.

The effectiveness of this adaptation is also reflected in the teachers' ability to orchestrate platforms based on specific pedagogical goals, which in the TPACK framework is conceptualized as TPK. A hybrid strategy is implemented by separating the JMD platform for summative assessments to ensure administrative data accuracy, and the use of interactive platforms like Quizizz, Kahoot, and Jogja Belajar for formative assessments. This separation reflects the teachers' understanding that each platform possesses characteristics suitable for different evaluation functions. The use of gamification elements in formative instruments can be understood as a form of teacher agency the teachers' capacity to act proactively in responding to contextual conditions (Jamilah & Agustin, 2025). Teachers utilize the appeal of gamification to mitigate students' psychological constraints, such as fatigue or drowsiness due to dense learning activities at the *pesantren*. This strategy gains support from several studies indicating that platforms like Quizizz and Kahoot can enhance student motivation and engagement in formative assessments (Hariyanto & Tiofani, 2025). Here, teachers do not merely act as technical implementers but as instructional designers capable of selecting the most relevant technology for the students' affective conditions.

As a note, the synthesis mapping in this research matrix is focused on the knowledge intersections (TCK and TPK) as well as the specific challenges of affective assessment, and does not separately present the three basic TPACK domains (Technological, Pedagogical, and Content Knowledge). This is based on the analytical argument that the basic domains, particularly the TK domain, have been facilitated and discussed previously through institutional capacity building (training), while the PK and CK domains are fundamental competencies inherently mastered by IRE teachers. Therefore, the true and most crucial adaptation dynamics to be mapped occur precisely at the intersection of their integration (TCK and TPK) when dealing directly with the digital transition.

From an infrastructure perspective, the success of adaptation at MAN 1 Kulon Progo asserts that facility availability is a significant precondition variable for the digital transformation of assessment. This is relevant to the study that identified facility limitations as one of the primary barriers to digitalization in madrasahs. At MAN 1 Kulon Progo, this variable is fulfilled through an investment in 30 computer units with adequate specifications (16GB RAM) and laptop ownership by almost all teachers, which collectively reduces technological resistance, including among the senior teacher group. This infrastructure readiness also functions as an instrument of digital inclusivity: the madrasah computer laboratory becomes a solution for students who lack personal devices or who are subject to rules restricting mobile phone use in the *pesantren* dormitories. Nevertheless, the

study by Ainul et al. (2024) cautions that the digital divide remains an issue that needs to be anticipated in the long term, particularly regarding the sustainability of infrastructure maintenance and the intergenerational digital competency gap among teachers.

Table 1. Synthesis Matrix of IRE Teachers’ TPACK Manifestations in Digital Assessment

Knowledge Domain (TPACK)	Practice Manifestations at MAN 1 Kulon Progo	Pedagogical Goals & Values
Technological Content Knowledge (TCK)	Transformation of normative materials (Fiqh/Akidah) into HOTS questions with case narrative stimuli; collaboration via JMD question bank features.	Preserving the essence and depth of religious materials to prevent reduction in digital formats; encouraging students’ contextual analysis.
Technological Pedagogical Knowledge (TPK)	Application of a hybrid strategy: JMD for summative assessment & Quizizz/Kahoot for formative assessment (gamification).	Orchestration of measurement tools according to function; mitigating psychological fatigue of pesantren students; enhancing motivation and interaction.
Affective Assessment (Integration Challenge)	Conversion of discipline and responsibility indicators into the madrasah’s digital system rubric.	Maintaining the authenticity of character and moral attitude assessments amidst high digital automation.

One of the challenges that has not been fully resolved in the context of digital IRE assessment is the evaluation of the affective domain. Although automation through digital systems offers high efficiency via instant score analysis and automatic ranking, IRE teachers still prioritize the authenticity of assessment in the dimensions of attitudes and character karakter (Karulita & Sugeng, 2025). Teachers synergize discipline and responsibility indicators into assessment rubrics that are subsequently converted into the madrasah’s digital system. This practice demonstrates that robust TPACK integration allows teachers to control technology to enhance the objectivity of moral and spiritual assessment, rather than the other way around. However, the complexity of affective assessment in digital formats still requires further exploration, considering that standardized rubrics potentially reduce the individual nuances of students’ character development (Hanafi et al., 2025). Ultimately, platform adaptation and technical constraint mitigation at MAN 1 Kulon Progo represent a blend of responsive facility management, teachers’ pedagogical flexibility, and dynamic interaction among the three TPACK domains in preserving the integrity and essence of religious education in the digital era.

4. CONCLUSION

This research reveals that the adaptation of Islamic Religious Education (IRE) teachers at MAN 1 Kulon Progo in utilizing digital platforms for learning assessments occurs through a mature integration of technological, pedagogical, and content knowledge (TPACK). Teachers do not solely rely on the formal Jogja Madrasah Digital (JMD) platform for summative assessments but also strategically adopt interactive platforms such as Quizizz and Kahoot to maintain student motivation and engagement in formative assessments. This adaptation process is sustained by strong institutional support, both in the form of repetitive training and the provision of adequate digital infrastructure.

In facing technical contingencies, teachers demonstrate the capacity for classroom orchestration and adaptive expertise through access redundancy strategies and shifting the exam mode to the computer laboratory, which simultaneously guarantees digital equity for

students with device limitations. Theoretically, this research contributes to the development of TPACK discourse by affirming that in the context of Islamic Religious Education, the synthesis of teachers' knowledge must transcend standard technical-pedagogical integration (TCK and TPK); it demands a dimension of specialized expertise to formulate evaluation instruments that are spiritually and morally authentic. Nevertheless, the TPACK synthesis in digital IRE assessment still leaves a challenge in evaluating the affective domain, where digital automation has not yet been fully capable of capturing the individual nuances of students' character development.

Overall, these findings assert that the success of teacher adaptation is not solely determined by personal technical proficiency, but rather is the synergistic result of teacher agency, instructional leadership, competency development policies, and the availability of inclusive infrastructure. Therefore, further development is needed regarding the design of technology-based affective rubrics capable of recording the complexity of spiritual and moral values, alongside comparative research in madrasahs with varying levels of digital readiness to enrich the understanding of similar dynamics in other contexts.

REFERENCES

- Adiyono, A., Fitri, A. Z., & Sanam, A. I. (2025). LMS-based assessment and Islamic pedagogy: A qualitative case study in an Indonesian private university. *Journal of Educational Research and Practice*, 3(3), 509–527.
- Ainul, Y., Mohammad, D. M., Hendi, K., Hasan, B., & Hefniy, H. (2024). The digital divide: How madrasah uses technology to improve brand image. *Aktivisme: Jurnal Ilmu Pendidikan, Politik dan Sosial Indonesia*, 2(1), 189–200.
- Azizi, M. H., Putra, I. M., & Saman, S. (2024). Adaptasi guru terhadap teknologi pendidikan di era digital: Tantangan dan peluang. *Jurnal Pendidikan dan Pembelajaran Khatulistiwa (JPPK)*, 1(01), 1033–1044.
- Azka, S. (2025). *Digitalisasi pembelajaran di madrasah aliyah berbasis pesantren salaf: Studi multi kasus di MA Qudsiyyah Kudus dan MA NU Banat Kudus* [Thesis]. UIN Sunan Ampel Surabaya.
- Creswell, J. W. (2009). *Research designs: Qualitative, quantitative, and mixed methods approaches*, Sage Publications.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*.
- Dillenbourg, P. (2013). Design for classroom orchestration. *Computers & Education*, 69, 485–492.
- Hanafi, Y., Saefi, M., Ikhsan, M. A., Diyana, T. N., Ahsanuddin, M., Alfian, M., Yani, M. T., Hazin, M., Chamidah, D., & Mustakim, S. S. (2025). Unveiling the intersection of technology and pedagogy: A domain-specific exploration for developing religious moderation content with an exploratory and Rasch perspective. *British Journal of Religious Education*, 47(4), 552–565.
- Hariyanto, H., & Tiofani, S. (2025). Optimalisasi hasil belajar melalui pretest dan posttest menggunakan gamifikasi pada mata kuliah Bahasa Indonesia. *Gurindam: Jurnal Bahasa dan Sastra*, 5(1), 48–60.

- Hatano, G., & Inagaki, K. (1986). Two courses of expertise. In H. Stevenson, H. Azuma, & K. Hakuta (Eds.), *Child development and education in Japan* (pp. 262–272). Freeman.
- Jamilah, S., & Agustin, M. (2025). Implementation of higher order thinking skills (HOTS) in fiqh learning assessment at Madrasah Aliyah Nurul Islam. *Al-Iltizam: Jurnal Pendidikan Agama Islam*, 10(2), 174–195.
- Karulita, S., & Sugeng, S. (2025). Model evaluasi otentik dalam pembelajaran PAI untuk penguatan karakter siswa di era digital. *EDU SOCIETY: Jurnal Pendidikan, Ilmu Sosial dan Pengabdian kepada Masyarakat*, 5(3), 759–768.
- Karunaratne, T., Axelsson, P., Lindblad, E., & Enoksson, F. (2025). The devil is in the details: Digital assessment opportunities and challenges in higher education—A case study from Swedish engineering education. *EDULEARN25 Proceedings*, 5060–5070.
- Kementerian Agama DIY. (2026). *Portal Jogja Madrasah Digital*. <https://portal.jogjamadrasahdigital.net/>
- Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)? *Journal of Education*, 193(3), 13–19.
- Küng, J., & Brovelli, D. (2025). The impact of teacher training on the evaluation and selection of STEM augmented reality applications and TPACK self-assessment. *Frontiers in Psychology*, 16, 1657028.
- Li, L., & Wang, X. (2021). Technostress inhibitors and creators and their impacts on university teachers' work performance in higher education. *Cognition, Technology & Work*, 23(2), 315–330.
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Sage.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054.
- Nurhayati, F., Fathimah, N. S., Abdillah, N., Nurdiansyah, A., Maulana, H., Santora, P., Faiz, K., Desi, R., & Koswara, U. (2025). Balancing innovation and tradition: Implementing technology-based evaluation in Islamic religious education. *Al-TA'DIB: Jurnal Kajian Ilmu Kependidikan*, 150–160.
- Priestley, M., Biesta, G., & Robinson, S. (2026). *Teacher agency: An ecological approach*. Bloomsbury Publishing.
- Salmon, D., & Kelly, M. (2014). Using concept mapping to foster adaptive expertise: Enhancing teacher metacognitive learning to improve student academic performance.
- Sholikah, D. S. (2025). *Strategi pengembangan program digitalisasi madrasah dalam meningkatkan layanan pendidikan di Madrasah Aliyah Negeri 2 Mojokerto*. <http://digilib.uinsa.ac.id/82008/>
- Zamzami, F. (2025). Platform digital dan peningkatan mutu evaluasi pembelajaran PAI. *Republika.co.id*. <https://analisis.republika.co.id/berita/sv5bk7393/>