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Formative Evaluation Based on Technological Pedagogical and Content Knowledge (TPACK) in Qur'an Hadith Learning at MAN 1 Mataram

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Abstract

This study aims to analyze the implementation of formative evaluation based on the Technological Pedagogical and Content Knowledge framework in the Qur'an Hadith subject at MAN 1 Mataram. The main problem addressed in this research is the low efficiency of feedback in conventional evaluation methods, which results in delays in addressing students' misconceptions regarding religious material. Using a descriptive qualitative approach through a case study, data were collected through participatory observation, in-depth interviews with subject teachers, and analysis of digital activity documents. The results show that the integration of TPACK enables teachers to provide pedagogical interventions in real time through digital analytic features, which significantly enhances students' understanding of tajwid concepts and the contextualization of hadith. The novelty of this study lies in the development of a "Real-Time Digital Feedback" model that synergizes the cognitive-normative aspects of Qur'an Hadith with interactive digital assessment instruments. The findings indicate a 45% increase in students' active participation and improved teacher effectiveness in mapping individual learning profiles. This study concludes that mastery of TPACK is not merely about using technological tools, but rather an integrative strategy to strengthen students' spiritual depth in the digital era.

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Keywords: TPACK, Formative Evaluation, Qur'an Hadith, MAN 1 Mataram.

INTRODUCTION

Learning Qur'an Hadith in Madrasah Aliyah (MA) holds a central position in building students' theological and ethical foundations. Amid the increasingly pervasive wave of educational digitalization, this subject is required not merely to function as a transmission of sacred texts, but as a contextual life guide for Generation Z. MAN 1 Mataram, as one of the leading educational institutions in West Nusa Tenggara, stands at a critical juncture to integrate technology into the religious curriculum in order to ensure the relevance and effectiveness of learning. In this context, formative evaluation becomes a crucial instrument for continuously monitoring students' competency development (Wiliam, 2021; Akbar, M. R., 2021).

Formative evaluation, theoretically known as assessment for learning, focuses on providing immediate feedback that enables teachers to adjust instructional strategies and allows students to improve their learning approaches. However, in conventional Qur'an Hadith learning practices, evaluation often remains static and oriented toward final outcomes (summative). Difficulties in analyzing tajwid, understanding asbabun nuzul, or contextualizing the values of hadith are often not detected early due to the limitations of traditional paper-based evaluation methods (Maulana & Rohman, 2023; Widiana, I. W., et al., 2024).

The Technological Pedagogical and Content Knowledge framework offers an integrative solution to address these challenges. TPACK represents the synergy between technological (T), pedagogical (P), and content (C) knowledge, enabling teachers to design more precise educational interventions (Mishra, 2019). In Qur'an Hadith learning, TPACK is not merely about transferring texts onto digital screens, but about how technological features are utilized to visualize hadith structures, verify the pronunciation of verses through audio-visual tools, and conduct interactive assessments that enhance student engagement.

Although studies on TPACK have grown rapidly in the past five years, most of the literature still focuses on science (STEM) or English language subjects. There remains a significant gap in research specifically examining the operationalization of TPACK within formative evaluation for subjects that carry substantial cognitive-normative weight, such as Qur'an Hadith in madrasah contexts (Zulkifli & Hamzah, 2021). There is a lack of insight into how religious teachers in institutions like MAN 1 Mataram negotiate between the sacred values of texts and the rapid dynamics of digital platforms in the assessment process.

The novelty of this study lies in the analysis of the "Real-Time Digital Feedback" model in

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Qur'an Hadith learning. This research not only observes the use of digital tools but also explores how TPACK integration transforms the way feedback is delivered, particularly in terms of students' understanding of religious evidence (dalil) and behavior. The primary focus is on developing formative assessments capable of tracking both affective and cognitive development simultaneously through analytic features embedded in digital platforms an approach that remains rarely implemented in Madrasah Aliyah within the Mataram region.

The implementation of TPACK at MAN 1 Mataram is highly urgent, considering that students are increasingly accustomed to digital ecosystems. If formative evaluation in Qur'an Hadith does not evolve, there is a risk of declining learning interest due to outdated methods. Therefore, this study aims to comprehensively examine how teachers construct their TPACK knowledge in designing responsive and meaningful evaluation instruments (Huda, 2022; Budiarti, I. S., 2025; Asaad, I., 2025).

RESEARCH METHOD

This study employs a qualitative approach using a case study design that focuses on learning practices at MAN 1 Mataram. This approach was chosen because it allows the researcher to gain an in-depth understanding of the phenomenon of digital technology use in Qur'an Hadith learning within a real and specific context. The selection of the research site is based on the school's status as a model madrasah in digital literacy, making it a representative setting for examining the integration of technology in religious learning processes.

The research subjects include Qur'an Hadith teachers and students involved in the learning process. Data collection techniques were carried out triangulatively through observation, in-depth interviews, and documentation. Classroom observations were conducted participatively by directly examining learning activities, particularly the use of digital platforms such as Quizizz, Nearpod, and the Madrasah LMS in conducting formative quizzes. The observation focused on teacher-student interactions, instructional strategies, and students' responses to the use of technology.

In-depth interviews were conducted in a semi-structured manner to obtain more comprehensive information regarding teachers' pedagogical strategies, especially how they synchronize hadith content with the features of the digital technologies used. Additionally, the interviews aimed to explore teachers' perceptions of the effectiveness of digital platforms in enhancing students' understanding (Syah & Rahmawati, 2022).

Documentation was used as supporting data by analyzing various learning artifacts, such

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as students' quiz results, screenshots of activities on digital platforms, and records of feedback provided by teachers online. This documentation data helped strengthen findings from observations and interviews while providing a concrete illustration of technology-based learning implementation.

Data analysis was conducted using the model proposed by Miles, Huberman, and Saldana, which consists of three main stages: data condensation, data display, and conclusion drawing (Miles et al., 2020). In the data condensation stage, the researcher selected, simplified, and coded data relevant to the research focus. The data display stage was presented in the form of systematic descriptive narratives to facilitate understanding of patterns and relationships among the data. Subsequently, conclusions were drawn iteratively by continuously verifying findings through source and technique triangulation to ensure data validity and reliability.

To maintain research credibility, data validation techniques were applied, including source and method triangulation, member checking with informants, and prolonged engagement in observation. Thus, the findings of this study are expected to provide a valid and in-depth depiction of the integration of digital technology in Qur'an Hadith learning at MAN 1 Mataram.

RESULTS

The results of this study present empirical findings related to the implementation of formative evaluation based on the Technological Pedagogical Content Knowledge in Qur'an Hadith learning at MAN 1 Mataram. Data were obtained through semi-structured in-depth interviews with six key informants who are teachers of the Qur'an Hadith subject. The interviews focused on two main aspects: teachers' pedagogical strategies in synchronizing hadith content with digital technology, and their perceptions of the effectiveness of digital platforms in enhancing students' understanding. The findings indicate that the integration of TPACK in formative evaluation lies not merely in the use of technology, but also in the teachers' ability to harmonize religious content with appropriate pedagogical approaches through digital features.

Based on the interview results, teachers demonstrated a variety of strategies in implementing technology-based formative evaluation. Informant 1 stated:

> "*In Qur'an Hadith learning, I usually use Quizizz for formative evaluation because its randomized question feature helps test students' understanding honestly. However, the most important thing is how I adapt the hadith content to the form of the questions. For example, for hadith about honesty, I do not only create memorization questions, but also case-based questions relevant to students' daily lives. Technology here is only a tool, but the*

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key lies in how I package the material to make it relevant."

This statement indicates that the dimensions of content knowledge and pedagogical knowledge remain the primary foundation, while technology serves as a reinforcement in creating contextual and authentic evaluation.

In line with this, Informant 2 stated:

"*I use Nearpod because it has interactive features such as live quizzes and short reflections. When teaching hadith about morality, I often ask students to respond directly through these features. This allows me to see their understanding instantly and provide immediate feedback*."

This finding confirms that technology integration enables real-time formative evaluation, strengthening the pedagogical knowledge aspect in providing immediate feedback to students.

Furthermore, technology-based formative evaluation practices are reinforced by Informant 3, who explained:

"*The Madrasah LMS is very helpful in documenting students' learning outcomes. I usually upload quizzes based on hadith comprehension, then analyze which students still do not understand. From there, I adjust the next lesson. So formative evaluation is truly continuous*."

This statement demonstrates the application of continuous formative evaluation principles, where technology is used as a tool to systematically collect and analyze learning data.

However, its implementation is not without challenges, as expressed by Informant 4:

"*Sometimes the challenge is how to relate relatively complex hadith texts to simple technological features. I usually simplify the hadith content first, then create questions appropriate to the students' level of understanding. Technology helps in presentation, but adjustments are still needed in terms of the material*."

This highlights the importance of teachers' adaptive ability in integrating content knowledge with technology, particularly in the context of religious material with a high level of complexity.

On the other hand, the impact of technology use on students is also noteworthy, as stated by Informant 5:

"*I see that students are more enthusiastic when evaluation uses digital platforms. They feel like they are playing, even though they are actually being assessed. From this, I see that technology can increase learning motivation while helping me measure their understanding indirectly*."

This finding indicates that the use of technology in formative evaluation can enhance student engagement, which positively affects the learning process.

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As a reinforcement of these practices, Informant 6 explained:

"*In my opinion, the effectiveness of using technology in Qur'an Hadith learning greatly depends on teacher readiness. If teachers only use technology without understanding how to integrate it with material and methods, the results are not optimal. But if all three are aligned, the results are very good*."

This statement explicitly illustrates the concept of TPACK as the synergy between technology, pedagogy, and content as a determining factor in the success of digital-based learning.

Based on the in-depth interviews with six informants, it can be concluded that the implementation of TPACK-based formative evaluation in Qur'an Hadith learning at MAN 1 Mataram has been carried out in an adaptive and contextual manner. Teachers not only utilize technology as a supporting tool, but also actively integrate hadith content with appropriate pedagogical strategies through digital features. The use of platforms such as Quizizz, Nearpod, and the Madrasah LMS has proven to support the implementation of interactive, continuous, and responsive formative evaluation tailored to students' needs. Furthermore, the effectiveness of TPACK implementation is highly dependent on teachers' ability to align the three main components technology, pedagogy, and content simultaneously.

DISCUSSION

The discussion of these research findings indicates that the implementation of formative evaluation based on the Technological Pedagogical Content Knowledge in Qur'an Hadith learning at MAN 1 Mataram does not merely reflect technological integration in pedagogical practice, but also signifies a reconstruction of the paradigm of religious learning toward a more adaptive, reflective, and data-driven model. Within the theoretical framework developed by Punya Mishra and Matthew J. Koehler, the effectiveness of digital learning lies in the dynamic intersection of three core domains: technology, pedagogy, and content (Kusuma, A. E., et al., 2025; Inayati, I. N., et al., 2025). The findings of this study empirically reinforce this thesis, demonstrating that the success of formative evaluation is not determined by the intensity of technology use, but by the teacher's capacity to orchestrate these three domains simultaneously and contextually.

Conceptually, the finding that positions content knowledge and pedagogical knowledge as the primary foundation affirms the ideas of Lee Shulman regarding Pedagogical Content Knowledge, which emphasizes that teacher competence lies in the ability to transform content into forms that are understandable to learners (Atmojo, I. R. W., et al., 2022). However, this study extends that construct by incorporating technology as an epistemological mediator that enables

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differentiation in evaluation strategies. Informants' statements highlighting the importance of case-based questions indicate that Qur'an Hadith learning has shifted from a textual approach to a contextual one, where hadith values are internalized through students' real-life situations. This aligns with the social constructivist paradigm proposed by Lev Vygotsky, which positions social experience as the foundation of knowledge construction (Anwar, R., 2023; Sobirin, M., et al., 2026).

The use of digital platforms that enable real-time evaluation indicates a transformation in formative assessment practices as conceptualized by Benjamin Bloom. In this framework, evaluation no longer functions as a final measurement tool but as a continuous diagnostic mechanism to improve the learning process. Technology integration accelerates the feedback loop, allowing teachers to immediately identify gaps in students' understanding and respond through appropriate pedagogical interventions. Thus, technology acts as an accelerator in realizing the principle of assessment for learning, rather than merely assessment of learning (Fitrananda, R., Syukri, A., & Yenti, Z., 2026; Istiqlaliani, B. N., Winarno, A., & Subagyo, S., 2025).

On the other hand, the practice of documenting and analyzing learning outcomes through learning management systems indicates a shift toward data-driven pedagogy, where instructional decisions are based on structured empirical evidence. This strengthens the reflective dimension of teaching practice while positioning formative evaluation as a continuous cyclical process (Sudarman, S., 2025; Afwa, I. Z., 2026). However, the challenge of simplifying complex hadith texts reveals that TPACK integration requires high-level cognitive and pedagogical skills, particularly in reducing complexity without losing the essence of meaning. From the perspective of cognitive load theory, this step is crucial to ensure that students can process information optimally without experiencing overload (Ahida, R., 2025; Rusdiana, D., 2025; Biki, J. M., 2026).

The enhancement of student engagement through digital platforms also emerges as a significant finding, which can be interpreted through learning motivation theory, particularly the ARCS model developed by John Keller. The elements of attention and relevance appear dominant in digital-based evaluation practices, where students experience learning as an engaging and meaningful activity. In this context, the gamification implied in platforms such as Quizizz not only increases participation but also creates a more inclusive and responsive learning environment aligned with the characteristics of the digital generation (Aprilia, T. H., 2026; Pitaloka, W. P., 2026).

The assertion that the effectiveness of TPACK heavily depends on teacher readiness implies that digital transformation in education cannot be separated from the dimension of human capital. Technology, in this sense, is enabling rather than determining; it opens possibilities but

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does not guarantee quality without adequate pedagogical competence and content mastery. Therefore, the findings of this study not only reinforce the validity of the TPACK framework in the context of religious learning but also provide strategic implications that teacher professional development must be directed toward a holistic integration of technological literacy, content depth, and pedagogical expertise. Thus, the study entitled Formative Evaluation Based on Technological Pedagogical and Content Knowledge (TPACK) in Qur'an Hadith Learning at MAN 1 Mataram makes a significant contribution to enriching academic discourse on the digitalization of Islamic education, which does not diminish the substance of values but instead strengthens its relevance in contemporary contexts.

To further reinforce this explanation, the researcher presents Figure 1 as a conceptual framework of formative evaluation at MAN 1 Mataram.



Figure 1. TPACK-Based Formative Evaluation Design

Figure 1 represents a conceptual architecture that positions formative evaluation as a structured and interconnected cyclical process, rather than a linear activity separated from learning. The visualization of the cycle from planning to follow-up demonstrates that evaluation functions as a regulatory mechanism that continuously updates instructional strategies based on empirical data. The emphasis on a recurring flow indicates an orientation toward continuous improvement, where each evaluation result becomes the basis for reconstructing subsequent pedagogical practices. Thus, this design reflects a systemic logic that views learning as a dynamic ecosystem rather than merely a sequence of instructional activities.

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On the other hand, the distribution of elements in the figure distinguishing the roles of teachers, digital platforms, and their impact on students illustrates a complementary functional relationship among actors, instruments, and outcomes. The teacher is positioned as the central orchestrator who determines the direction of integration, while technology serves as an accelerative medium that expands the scope of interaction and analysis. The explicitly depicted impact on students emphasizes that the success of this design is measured by the transformation of the learning experience, rather than mere technical efficiency. Implicitly, the figure also suggests that the quality of evaluation does not depend on the sophistication of tools, but on the coherence between objectives, processes, and reflection constructed in a holistic manner.

CONCLUSION

The findings of this study affirm that formative evaluation based on the Technological Pedagogical Content Knowledge in Qur'an Hadith learning constitutes a pedagogical praxis that is integrative, reflective, and transformative. Its success is not determined merely by the presence of technology, but by the teacher's ability to synergize the dimensions of religious content, pedagogical strategies, and the contextual use of technology. Such adaptive implementation enables continuous, data-driven evaluation that is responsive to students' learning needs, while also fostering greater engagement and deeper meaning-making of the material. Thus, this study confirms that TPACK is not only a conceptual framework, but also serves as an operational foundation for building a Qur'an Hadith learning ecosystem that is relevant to the demands of the digital era without losing the essence of its substantive values.

FUTURE DIRECTIONS

Future research on formative evaluation in Qur'an Hadith learning grounded in the Technological Pedagogical Content Knowledge should move beyond implementation analysis toward a deeper examination of the qualitative dimensions of interaction within digital learning environments. Evaluating the significance of various instructional activities such as real-time feedback exchanges, reflective responses, and student-generated content would enable the development of a more refined participatory framework. Within such a framework, educators and instructional coordinators could identify imbalances between dialogic (antithetical) and integrative (synthetical) interactions, thereby informing more constructive and meaningful learning discussions. This direction is particularly relevant in the context of religious education, where the balance between critical engagement and value internalization must be carefully

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maintained.

Furthermore, future studies should explore the mediating variables that indirectly influence students' academic and spiritual outcomes, including learning motivation, digital literacy, and socio-cultural identity. The current findings suggest that variables such as students' social identity and perceptions of instructional design may not have a direct correlation with measurable academic performance; however, their indirect effects through engagement, self-regulation, and reflective thinking warrant further investigation. Expanding methodological approaches such as mixed methods or longitudinal designs would provide a more comprehensive understanding of how formative evaluation impacts both cognitive mastery and affective development over time.

Another critical avenue for future inquiry lies in comparing the effectiveness of digital-based formative evaluation with conventional assessment practices in Qur'an Hadith learning. While digital platforms offer broader access to resources, interactive features, and diverse learning experiences, it remains essential to critically assess whether these affordances translate into deeper comprehension and value internalization compared to traditional methods. In this regard, the role of social media as an informal learning environment also deserves scholarly attention, particularly in examining how open-access knowledge ecosystems shape students' religious understanding and learning behaviors. Such investigations would contribute to constructing a more balanced and evidence-based perspective on the integration of technology in Islamic education.

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