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Technology Transformation in Islamic Religious Education Student Learning in Facing 2025 Trends Using SAMR and TPACK Models

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ABSTRACT

This study examines how 2025 educational technology trends are transforming Islamic Religious Education (IRE) student learning and how the SAMR and TPACK frameworks guide that integration. A convergent-parallel mixed-methods design was used in Indonesian IRE institutions: surveys of students and educators quantified perceived impacts and levels of integration, while interviews and focus group discussions explored experiences and challenges; quantitative data were analyzed with descriptive/inferential statistics and qualitative data with thematic analysis. Results indicate strong perceived benefits of AI-driven personalization, VR/AR, and gamification for engagement and accessibility, with hybrid models supporting flexibility. However, classroom practice is concentrated at lower SAMR levels (Substitution, Augmentation), with limited movement to Modification/Redefinition. Educators report high content and pedagogical knowledge, moderate technological knowledge, and the lowest confidence in integrated TPACK; barriers include workload, training gaps, infrastructure, and preserving Islamic ethical values. We conclude that IRE can leverage emerging technologies to enrich learning, but true transformation requires targeted, context-specific TPACK professional development, curriculum redesign toward higher-order SAMR tasks, robust ethical/digital-literacy safeguards, and equitable infrastructure investment.

Keywords: educational technology, education, SAMR model, TPACK framework

INTRODUCTION

The dawn of the digital age has ushered in an unprecedented era of transformation across all sectors, and education has been among the most profoundly affected [1], [2]. Contemporary educational systems are rapidly weaving advanced tools such as artificial intelligence (AI), augmented reality (AR), virtual reality (VR), adaptive learning systems, and gamification into the fabric of teaching and learning [3]. This technological evolution is not a superficial addition of gadgets to the classroom; rather, it signals a fundamental reorientation of pedagogy away from traditional teacher-centered instruction toward dynamic, interactive, and student-centered learning experiences [4]. Propelled by the promise of broader access to information, personalized learning pathways, and heightened student engagement, this shift redefines what it means to teach and to learn [3].

Across the global educational landscape, digital technology has ceased to be an optional accessory and has become an integral ecosystem that permeates every aspect of schooling [4]. Online learning applications, educational software, and immersive technologies now mediate knowledge construction with remarkable efficiency and appeal [5]. Artificial-intelligence-driven platforms analyze learners' strengths, weaknesses, and preferred learning styles in real time, tailoring content, pacing, and feedback to the needs of each individual, thereby operationalizing the long-idealized vision of truly personalized education [3]. The result is a learning environment in which technology is not merely supportive but foundational, enabling pedagogical approaches that would be inconceivable otherwise [6].

These sweeping changes are being accelerated by learners themselves, whose expectations have shifted decisively toward flexibility and personalization [7]. Students increasingly reject rigid, one-size-fits-all models in favor of educational experiences that adapt to their unique rhythms, interests, and contexts [8], [9]. Consequently, hybrid and flexible learning models that seamlessly blend in-person and online modalities have proliferated, widening access and accommodating diverse learning preferences [10], [11], [12]. The insistence on personalization, interactivity, and accessibility compels institutions to integrate technology proactively as a strategic necessity for relevance and effectiveness [13], [14].

Within the specialized domain of Islamic Religious Education (IRE), the integration of technology presents both transformative opportunities and distinctive challenges that demand nuanced consideration [15], [16]. Sophisticated digital tools now open novel avenues for disseminating Islamic knowledge and cultivating religious skills in ways that resonate with digitally native students [17]. Online Islamic libraries, interactive multimedia, and carefully curated educational videos enrich lessons [18], while students use tablets and smartphones to explore Qur'anic commentary, collaborate on Islamic history projects, and participate in virtual jurisprudential discussions—bridging classical scholarship with contemporary affordances [19], [20].

Yet the modernization of IRE through technology is fraught with complexity. A central concern is the risk of diluting traditional values and compromising the integrity of Islamic teachings amid the allure of digital innovation [21]. This tension generates a dual imperative: harness technology for pedagogical advancement while safeguarding the spiritual and ethical core of the faith [22]. Achieving this balance requires a principled approach that evaluates each technological intervention against enduring aims of Islamic education to ensure that progress does not come at the cost of authenticity [23].

Compounding these challenges is the persistent digital divide, which threatens to exacerbate existing inequalities within IRE [24]. Although technology promises equitable access anytime and anywhere, disparities in device availability, connectivity, and digital literacy can disadvantage learners from lower socio-economic backgrounds [25]. If unaddressed, such inequities risk widening gaps in religious literacy and engagement, undermining the egalitarian ethos that Islamic education seeks to uphold [26]. Strategic investment in infrastructure and comprehensive digital literacy training is therefore essential so that benefits are shared inclusively across the Muslim community [27].

Despite strong interest in technology-enhanced IRE, a critical gap remains: few studies purposefully align IRE learning transformation with anticipated 2025 trends while simultaneously linking task redesign (depth of integration) and teacher knowledge in a value-sensitive context. Novelty of this article lies in a dual-framework, article-scale analysis that jointly operationalizes the SAMR model to gauge integration depth and the TPACK framework to profile educators' integrated knowledge—offering actionable, ethics-aware design principles suited to journal scope rather than a multi-phase curricular development typical of theses or dissertations. Accordingly, this study aims to: (a) examine how 2025 technology trends influence IRE students' learning experiences; (b) assess the extent and perceived effects of SAMR-level implementation in IRE classrooms; (c) appraise IRE educators' TPACK for technology-enhanced teaching; and (d) identify key opportunities and constraints to inform ethically grounded, higher-order technology use in IRE.

RESEARCH METHODS

This study employs a mixed-methods research design, combining both quantitative and qualitative approaches to provide a comprehensive understanding of technology transformation in Islamic Religious Education (IRE) student learning. This design is particularly suited for exploring complex phenomena by allowing for a multifaceted examination from various perspectives, thereby elevating the rigor and impact of the research[28]. The quantitative component will identify patterns and measure the extent of technology integration and its perceived impact, while the qualitative component will delve into the underlying reasons, experiences, and perceptions of students and educators.

1. Research Design

A convergent parallel mixed-methods design will be used. Quantitative and qualitative data will be collected concurrently and independently from the same settings and participant groups. Each strand will be analyzed separately, after which the findings will be integrated and compared during joint analysis and interpretation. The quantitative strand will administer structured surveys to IRE teachers and students to estimate the depth of technology integration (SAMR levels), profile educators' TPACK, and examine measurable relationships with student-reported learning outcomes and engagement using descriptive and inferential statistics. The qualitative strand will conduct semi-structured interviews and focus group discussions to elicit lived experiences, contextual mechanisms, and implementation constraints/enablers; transcripts will undergo thematic analysis with double-coding for credibility. Integration will use joint displays and triangulation to assess convergence, complementarity, and divergence, producing meta-inferences that directly address the research objectives. This design provides a holistic account of how SAMR and TPACK are applied and perceived in IRE, capturing both measurable relationships and context-specific explanations.

2. Participants and Sampling

The target population comprises students and educators from Islamic Religious Education (IRE) institutions in Indonesia. Stratified random sampling will ensure representation across education levels (secondary/senior high school and tertiary/university), geographic context (urban and rural), and institutional technological readiness (low, medium, high based on bandwidth and device–student ratio). Sampling proceeds in two stages: institutions are randomly selected within strata, followed by random selection of classes or individuals. Eligibility includes currently enrolled IRE students and practicing IRE educators with at least six months of experience using technology for instruction. The required sample size will be established via a priori power analysis for the primary tests (associations among SAMR levels, TPACK scores, and student learning outcomes) with

α = .05 and power = .80, adjusted for design effect and anticipated nonresponse.

Purposive maximum-variation sampling will select information-rich participants who can speak to technology integration in IRE, enactment across SAMR levels, and practical TPACK. Variation will be secured across the same strata used in the quantitative strand. Data sources will include semi-structured interviews with educators and focus group discussions with students. Recruitment will continue until thematic saturation is reached.

3. Data Collection Instruments

a. Quantitative Data Collection

A structured survey questionnaire will be developed and administered to IRE students and educators. The questionnaire includes:

1) Demographic information: age, gender, educational level, years of teaching/learning, access to and frequency of technology use.
2) SAMR Application Scale: items that capture the depth of technology integration at the task level across Substitution, Augmentation, Modification, Redefinition [9]. Respondents indicate the frequency of tasks at each level (Likert 1–5). Scores yield (i) subscale means per SAMR level and (ii) a SAMR Integration Index (SII) computed as a weighted composite:

$$\mathrm{SII} = \frac{1 \cdot \bar{S} + 2 \cdot \bar{A} + 3 \cdot \bar{M} + 4 \cdot \bar{R}}{1 + 2 + 3 + 4}$$

3) Higher SII indicates deeper integration.
4) TPACK Self-Assessment Scale: items adapted from validated instruments to measure seven domains (CK, PK, TK, PCK, TCK, TPK, TPACK). Subscale means will be computed; an overall TPACK composite will be derived if unidimensionality is supported.
5) Perceived Impact of 2025 Technology Trends: items assessing how AI, VR/AR, adaptive/personalized learning, gamification influence IRE learning experiences.
6) Perceived Learning Outcomes: items measuring engagement, critical thinking, problem-solving, and overall learning outcomes in technology-enhanced IRE [29].

All items are closed-ended Likert scales to generate analyzable numerical data. Prior to the main study, content validity will be established via expert review; internal consistency (α/ω) will be evaluated in the pilot and main samples [30].

b. Qualitative Data Collection

Semi-structured interviews and focus group discussions (FGDs) with purposively selected students and educators will elicit lived experiences of technology integration, enactment across SAMR levels, practical TPACK, enablers, and constraints [30]. Open-ended prompts guide narratives on task design, classroom implementation, ethical considerations, and infrastructure. All sessions will be audio-recorded and transcribed verbatim for analysis.

4. Data Analysis

a. Quantitative Data Analysis

Preparation & Measurement Checks. Data will be screened (missingness/outliers), assumptions tested, and reliability assessed (Cronbach's α/McDonald's ω). If appropriate, confirmatory factor analysis will examine the measurement structure for TPACK and outcome constructs. Indices will be standardized where needed.

b. Analytic Strategy Aligned to Objectives

1) O1 (influence of 2025 trends on learning experiences): descriptive statistics of trend-impact scores; multiple regression predicting perceived learning outcomes from trend-impact scores, controlling for demographics and technological readiness.
2) O2 (extent & effects of SAMR): proportions and means for each SAMR level; SII used as a continuous predictor of learning outcomes (linear regression). Group differences across education level or readiness tested via ANOVA/ANCOVA.
3) O3 (educators' TPACK): descriptive profiles for seven domains; correlations between TPACK domains, SII, and outcomes; hierarchical regression entering TPACK domains after controls to estimate added explanatory power.
4) O4 (opportunities & constraints): integration with qualitative themes (see below) and, quantitatively, subgroup comparisons to surface patterns linked to infrastructure and experience

Where appropriate, Pearson correlations will estimate associations; multiple linear regression will model predictive relationships. Analyses will be conducted in SPSS or R.

c. Qualitative Data Analysis

A thematic analysis approach will be used:

1) Familiarization: repeated reading of transcripts.
2) Coding: abductive coding—deductive codes from SAMR (S/A/M/R) and TPACK domains plus ethics/infrastructure; inductive codes for emergent practices and constraints. A shared codebook will be developed; a subset will be double-coded to assess agreement (e.g., Cohen's $\kappa \geq 0.70$).
3) Theme Development: codes aggregated into themes and subthemes capturing mechanisms of effective/ineffective integration, movement toward higher-order SAMR, and practical manifestations of TPACK.
4) Review & Refinement: themes checked against full data and research objectives;

illustrative quotes retained for reporting.

Pattern Identification. Cross-case matrices will map participant profiles (e.g., high-SII/high-TPACK vs. low-SII/medium-TPACK) to recurring enablers/barriers and ethical safeguards. This surfaces actionable patterns linking depth of integration, teacher knowledge, and outcomes.

5. **Mixed-Methods Integration**

Following separate analyses, results will be integrated through joint displays (tables aligning quantitative indicators—means, correlations, regression coefficients—with qualitative themes and exemplar quotes) to assess convergence, complementarity, or divergence and to generate meta-inferences that directly answer O1–O4. For instance, quantitative evidence of higher SII predicting better problem-solving will be juxtaposed with themes describing how task redesign (Modification/Redefinition) and specific TPACK configurations enable those outcomes in IRE classrooms.

6. **Mixed Methods Integration**

The integration of quantitative and qualitative findings will occur during the interpretation phase. This involves comparing the statistical results with the thematic insights to identify areas of convergence, divergence, and complementarity [31]. For example, quantitative data might show a low application of Redefinition-level activities (SAMR), while qualitative data explains*why* this is the case (e.g., lack of teacher TPACK, insufficient infrastructure, concerns about value dilution). This integration allows for a more holistic and nuanced understanding of the complex phenomenon of technology transformation in IRE, providing a comprehensive and reliable understanding of the research problem [4].

RESULTAND DISCUSSION

1. **Influence of 2025 Educational Technology Trends on IRE Learning**

The quantitative findings demonstrate that emerging educational technology trends for 2025 are perceived to significantly influence Islamic Religious Education (IRE). AI-driven personalized learning received the highest rating (M = 4.25, SD = 0.68), reflecting strong acceptance among both students and educators. This result indicates that adaptive systems capable of providing individualized feedback and pacing are highly valued for promoting engagement and comprehension. Similar positive perceptions were observed for gamification and VR/AR applications (M = 4.10, SD = 0.72), which respondents believed made lessons more memorable and interactive. Hybrid learning models (M = 4.05, SD = 0.70) also emerged as a practical solution to meet diverse learning needs, providing flexible access to religious content [7]. However, learning analytics scored relatively lower (M = 3.80, SD = 0.85), suggesting limited familiarity with its pedagogical potential.

Qualitative data supported these quantitative trends, as students described AI tutors as tools that "understand my pace," particularly when grappling with complex aspects of Arabic grammar. Educators, on the other hand, emphasized that gamified platforms and immersive simulations increased students' motivation to learn, reinforcing findings that digital tools enhance active participation [32]. Yet, participants also voiced ethical concerns, particularly regarding the use of AI in representing Islamic knowledge. This duality suggests that while new technologies raise engagement, they also create uncertainties about authenticity and value alignment, making careful ethical guidance essential [22].

In summary, the integration of 2025 technology trends into IRE holds great promise but also presents challenges. While AI, gamification, and hybrid models encourage personalization, flexibility, and motivation, learning analytics has yet to be effectively integrated due to low data literacy among educators. These findings highlight the importance of combining technology adoption with professional development in data interpretation, ensuring that teachers can maximize pedagogical benefits while adhering to ethical principles [33]. Thus, emerging technologies must not only be adopted but also contextualized within the values of Islamic education.

2. **Application of the SAMR Model in IRE Classrooms**

Analysis of SAMR model application revealed that most IRE classrooms remain at the lower levels of technology integration. Substitution (M = 4.50, SD = 0.55) and Augmentation (M = 3.90, SD = 0.60) dominated classroom practices, demonstrating that educators primarily use technology to replace or slightly enhance traditional tools. For example, digital Qur'an and Hadith texts are widely used for convenience, while online quizzes or slides provide incremental improvements. However, deeper integration at the levels of Modification (M = 2.80, SD = 0.95) and Redefinition (M = 2.10, SD = 0.88) remains limited, showing that technology is rarely used to redesign or create new modes of religious learning [34].

Qualitative evidence corroborated these results. Educators noted the difficulty of redesigning lessons to reach Modification and Redefinition due to time constraints, workload pressures, and lack of technical support. Some participants explained that while they recognized the transformative potential of VR/AR and collaborative online platforms, implementing such tools required extensive preparation and institutional investment that was often unavailable. Moreover, caution about doctrinal authenticity was frequently cited, as teachers feared that experimental redesigns might dilute or misrepresent Islamic teachings [20]. These findings

highlight that the barriers to higher-order SAMR adoption are both structural and value-sensitive.

This limited progression within SAMR reflects a global challenge in educational technology adoption, where most institutions remain enhancement-heavy rather than transformative [35]. For IRE, the implications are more nuanced because the pedagogical shift must respect religious authenticity while engaging students with innovative tools. To overcome these barriers, targeted curriculum redesign, collaborative lesson planning, and context-specific exemplars are required. Only through these measures can educators be empowered to move beyond Substitution and Augmentation toward truly transformative practices in IRE.

3. Educators' Perceptions of TPACK

Educators' self-assessment of TPACK revealed high confidence in Content Knowledge (M = 4.45, SD = 0.50) and Pedagogical Knowledge (M = 4.30, SD = 0.60), which reflects their strong foundations in Islamic studies and teaching strategies. However, Technological Knowledge was reported as moderate (M = 3.50, SD = 0.75), and integrated domains such as TPACK itself scored the lowest (M = 3.10, SD = 0.80). This pattern indicates that while educators are competent in individual knowledge areas, they struggle to integrate them effectively to design transformative technology-enhanced learning [36].

Qualitative findings deepened this picture, as educators frequently used terms like "techno-complexity" and "techno-overload" to describe their struggles. Teachers explained that they often felt overwhelmed when balancing religious content, pedagogy, and digital tools simultaneously. Many emphasized that generic training sessions on technology were insufficient; what they needed was professional development tailored to the IRE context. For instance, educators stressed that understanding how a digital tool can specifically enhance Qur'an interpretation or Islamic history lessons is more valuable than general introductions to technology [29].

The low integration of TPACK explains the limited adoption of higher-level SAMR practices. Without robust TPACK, educators may remain stuck at Substitution or Augmentation, unable to redesign tasks or redefine learning experiences. Therefore, advancing TPACK in IRE requires sustained, context-specific professional development that links technological tools directly with religious content and pedagogy. Such professional learning communities could operate as "design studios," allowing teachers to collaboratively map technological possibilities onto Islamic educational goals [37]. This approach ensures that technology serves doctrinal integrity while fostering transformative teaching.

4. Opportunities for Technology in IRE

The study revealed several opportunities that highlight the potential of technology to enrich IRE. Quantitative findings suggest that emerging technologies such as AI, VR/AR, and hybrid learning significantly improve engagement and accessibility, while qualitative accounts describe how these tools make learning more interactive and personal. For example, students shared how virtual tours of historical Islamic sites allowed them to "experience history directly," enhancing their appreciation of Islamic heritage. Educators also highlighted how gamification created more dynamic classroom environments, motivating students to actively participate in religious studies [38].

Another opportunity identified is the personalization of learning paths. AI-driven systems allow students to study Qur'anic concepts or Arabic grammar at their own pace, creating tailored learning experiences that meet individual needs. Teachers emphasized that these innovations could make IRE more inclusive by accommodating different learning speeds and preferences. Furthermore, digital platforms facilitate access to a wider pool of Islamic scholarly resources, allowing students to connect with perspectives from across the globe [39]. These opportunities suggest that technology not only enriches knowledge acquisition but also fosters global engagement with Islamic scholarship.

From a broader perspective, the integration of technology provides a pathway for IRE to remain relevant in the digital age. By combining interactive methods with authentic religious content, educators can engage digitally native students more effectively while reinforcing core Islamic values. However, realizing these opportunities requires careful curriculum integration and professional support to ensure that technology enhances rather than distracts from the spiritual and ethical goals of Islamic education [17]. Thus, opportunities exist, but their realization depends on deliberate and principled application.

5. Challenges and Ethical Considerations

Despite the opportunities, significant challenges hinder the transformative adoption of technology in IRE. The most prominent barrier is the digital divide, where disparities in device ownership and internet access prevent equitable participation. Educators noted that students in rural or under-resourced areas often cannot fully engage with technology-enhanced learning, thereby exacerbating educational inequalities [24]. Such inequities undermine the egalitarian aims of Islamic education, which emphasizes inclusivity and fairness.

Another critical challenge is the risk of misinformation and superficial understanding. As educators pointed out, online resources may not always align with authentic Islamic teachings, raising concerns about students' ability to discern credible from unreliable information. This challenge emphasizes the importance of digital literacy programs that equip students to critically evaluate online religious content while safeguarding doctrinal

integrity [40]. Additionally, teachers expressed concern about the dilution of traditional teacher-student relationships, particularly the loss of spiritual mentorship that is central to IRE.

Addressing these challenges requires a strategic, holistic approach. Institutions must invest in robust infrastructure to bridge the digital divide, while simultaneously embedding ethics and digital literacy into the curriculum. Professional development should focus not only on technology skills but also on strategies to maintain authenticity and spiritual discipline in digital environments. By confronting these barriers directly, IRE can balance modernization with tradition, ensuring that technology serves as a vehicle for deepening faith and enhancing educational outcomes rather than undermining them [27].

CONCLUSION

In line with the study objectives, 2025 technologies (AI, VR/AR, hybrid models) are perceived to enrich IRE learning; however, classroom use remains concentrated at Substitution/Augmentation. Low integrated TPACK—rather than content or pedagogy alone—explains the limited progression to Modification/Redefinition, alongside value-sensitive concerns and access gaps. To unlock transformative impact, institutions should prioritise TPACK-centred, IRE-specific professional development; embed curriculum redesign toward higher-order SAMR tasks; implement ethics and digital-literacy safeguards; and invest in equitable infrastructure. These actions align technological adoption with Islamic educational aims and support sustained improvements in learning.

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