Integrating Technology Acceptance and Pedagogical Deep Learning in Islamic Education: A TAM-Based Study

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Abstract: This study investigates the integration of technology acceptance and pedagogical deep learning in Islamic Religious Education (IRE), where deep learning is conceptualized as a pedagogical approach that emphasizes meaningful understanding, reflective thinking, and enjoyable engagement, rather than artificial intelligence-based deep learning. Although previous studies have extensively examined technology acceptance and deep learning independently, empirical studies integrating the Technology Acceptance Model (TAM) with pedagogical deep learning in the context of Islamic education are still limited. To address this gap, this study uses a quantitative survey design involving 321 teachers and students selected through simple random sampling from a population of 1,287 participants. Data were collected using a validated Likert scale questionnaire (Cronbach's Alpha = 0.874) and analyzed through descriptive statistics and simple linear regression using SPSS version 25. The results of the study indicate that acceptance of TAM-based learning media has a significant and positive effect on the implementation of pedagogical deep learning (R^2 = 0.542, t = 12.884, p <0.001), showing that 54.2% of the variance in deep learning practices is explained by technology acceptance. Descriptive analysis shows that Perceived Usefulness recorded the highest average score among TAM constructs (M = 4.26), while Meaningful Learning emerged as the most dominant dimension in pedagogical learning (M = 4.23). Theoretically, this study expands TAM by positioning technology acceptance as a driver of deep, reflective, and value-oriented pedagogical learning in Islamic education. Practically, these findings provide evidence-based guidance for educators and schools in designing technology-supported IRE that promotes meaningful, attentive, and enjoyable learning experiences.

Abstrak: *Studi ini meneliti integrasi penerimaan teknologi dan pembelajaran mendalam pedagogis dalam Pendidikan Agama Islam (PAI), di mana pembelajaran mendalam dikonseptualisasikan sebagai pendekatan pedagogis yang menekankan pemahaman yang bermakna, pemikiran reflektif, dan keterlibatan yang menyenangkan, bukan pembelajaran mendalam berbasis kecerdasan buatan. Meskipun studi-studi sebelumnya telah secara ekstensif meneliti penerimaan teknologi dan pembelajaran mendalam secara independen, studi empiris yang mengintegrasikan Model Penerimaan Teknologi (TAM) dengan pembelajaran mendalam pedagogis dalam konteks pendidikan Islam masih terbatas. Untuk mengatasi kesenjangan ini, studi ini menggunakan desain survei kuantitatif yang melibatkan 321 guru dan siswa yang dipilih melalui pengambilan*

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sampel acak sederhana dari populasi 1.287 partisipan. Data dikumpulkan menggunakan kuesioner skala Likert yang tervalidasi (Alpha Cronbach = 0,874) dan dianalisis melalui statistik deskriptif dan regresi linier sederhana menggunakan SPSS versi 25. Hasil penelitian menunjukkan bahwa penerimaan media pembelajaran berbasis TAM memiliki pengaruh signifikan dan positif terhadap implementasi pembelajaran mendalam pedagogis (R² = 0,542, t = 12,884, p <0,001), menunjukkan bahwa 54,2% varians dalam praktik pembelajaran mendalam dijelaskan oleh penerimaan teknologi. Analisis deskriptif menunjukkan bahwa Kegunaan yang Dirasakan mencatat skor rata-rata tertinggi di antara konstruk TAM (M = 4,26), sedangkan Pembelajaran Bermakna muncul sebagai dimensi yang paling dominan dalam pembelajaran pedagogis (M = 4,23). Secara teoritis, penelitian ini memperluas TAM dengan memposisikan penerimaan teknologi sebagai penggerak pembelajaran pedagogis yang mendalam, reflektif, dan berorientasi nilai dalam pendidikan Islam. Secara praktis, temuan ini memberikan panduan berbasis bukti bagi pendidik dan sekolah dalam merancang IRE (Integrated Education and Learning) yang didukung teknologi untuk mendorong pengalaman belajar yang bermakna, penuh perhatian, dan menyenangkan.

INTRODUCTION

Learning media play a crucial role in supporting effective teaching and learning processes (Al-Rahmi, 2021). Beyond functioning as instructional tools, learning media serve as pedagogical bridges that connect teachers, students, and learning content in ways that enhance clarity, engagement, and conceptual understanding. Empirical studies consistently demonstrate that appropriate media selection contributes to improved learning effectiveness and deeper comprehension of subject matter (Mudinillah & Rizaldi, 2021; Hoerudin et al., 2023).

In the digital era, this role has become increasingly significant as educational practices shift from conventional media toward more interactive and adaptive digital learning environments. Recent evidence further indicates that video-based digital media positively influence student engagement and understanding, highlighting their strong potential for broader application in digital learning contexts, including Islamic and madrasah-based education in Indonesia (Jennah et al., 2024).

The rapid advancement of digital technology has transformed educational practices, requiring teachers to innovate in utilizing technology-based learning media to make learning more meaningful and relevant to students' lives. In the context of the Industrial Revolution 4.0, digital media are widely regarded as an urgent necessity for improving instructional effectiveness and efficiency (Metasari & Amalia, 2024). Previous studies further indicate that digital learning media foster students' learning motivation, encourage active participation, and facilitate understanding of abstract concepts (Permana et al., 2024; Widiastri & Puspita, 2024). However, these pedagogical benefits cannot be fully realized if teachers and students do not demonstrate positive acceptance of the technology being used.

From a theoretical perspective, technology acceptance is best understood

through the Technology Acceptance Model (TAM), which conceptualizes technology adoption as a form of technology-related behavior shaped primarily by perceived usefulness and perceived ease of use (Rahmawati & Narsa, 2019; Akbar & Bachtiar, 2024). These perceptions influence users' attitudes and intentions toward technology utilization. TAM has been extensively validated in educational research, including studies on e-learning adoption (Napitupulu et al., 2017), educational management applications such as SISMART (Effendi et al., 2021), parental acceptance of online learning platforms Kusumadewi et al., (2021), and digital learning platforms such as NUADU (Natasia et al., 2022). Collectively, these studies confirm that the effectiveness of educational technology depends largely on users' perceived benefits and ease of use.

At the same time, contemporary educational discourse has increasingly emphasized deep learning as a pedagogical approach aligned with reflective constructivist learning theory. Deep learning emphasizes meaningful understanding, critical reflection, and the ability to connect knowledge with real-life contexts rather than surface-level memorization (Nugraha, 2021; Alfayed et al., (2023; Muvid, 2024). Within Islamic Religious Education (IRE), this approach is particularly relevant because learning objectives extend beyond cognitive achievement to include moral reasoning, character formation, and the internalization of Islamic values. Through deep learning, students are encouraged to engage reflectively with religious knowledge and to apply its values meaningfully in their daily lives.

Despite the strength of both theoretical traditions, existing empirical studies reveal a clear fragmentation. Research grounded in TAM has predominantly focused on technology adoption, usage intention, and system effectiveness, with limited attention to how technology acceptance contributes to the depth and quality of learning processes (Napitupulu et al., 2017; Effendi et al., 2021; Kusumadewi et al., 2021; Natasia et al., 2022). Conversely, studies on deep learning have concentrated on pedagogical strategies and learning outcomes in inclusive and Islamic education contexts without systematically incorporating behavioral models of technology acceptance (Andriana, 2021; Lubis & Ariansyah, 2024). As a result, while previous research has explained how technology is accepted and how deep learning can be pedagogically implemented, it has not sufficiently addressed how technology acceptance functions as a pedagogical mechanism that enables or constrains the implementation of deep learning, particularly in Islamic education.

Based on these conditions, this study seeks to examine in depth the implementation of deep learning through the use of TAM-based learning media at SMAIT Al-Amin in Kapuas Regency. This study focuses on understanding the extent to which teachers and students accept the digital media used in Islamic Education learning, how this acceptance affects the deep learning process, and what strategies can be used to optimize the integration of technology and Islamic values in the teaching and learning process.

This unresolved issue is especially evident in integrated Islamic secondary schools such as SMAIT Al-Amin Kapuas Regency, which are characterized by adequate learning facilities, competent teaching staff, and a strong commitment to integrating Islamic values into educational practice (Zakaria & Amin, 2024). Although discourse on deep learning-oriented curricula has gained prominence, empirical evidence explaining

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whether teachers' and students' acceptance of digital media support the implementation of pedagogical deep learning in IRE remains limited. Accordingly, this study addresses the central research problem of to what extent technology acceptance, as conceptualized by TAM, influences the implementation of pedagogical deep learning in Islamic Religious Education.

By integrating TAM and pedagogical deep learning, this study offers a theoretical contribution by expanding the Technology Acceptance Model beyond its conventional focus on adoption behavior and positioning technology acceptance as a pedagogical driver of reflective, meaningful, and value-oriented learning. Therefore, Islamic educational institutions need to develop curricula, guidance services, and mentoring programs that explicitly accommodate spiritual approaches in dealing with academic pressures, in order to create a more supportive and holistic learning environment for students. (A'ini et al., 2025). Practically, this research provides evidence-based insights for IRE teachers and school leaders on how digital learning media can be designed and implemented not only for technological efficiency, but to truly support deep understanding, reflection, and internalization of Islamic values in the digital age.

METHOD

This study employed a quantitative survey design to examine the relationship between the acceptance of Technology Acceptance Model (TAM)-based learning media and the implementation of pedagogical deep learning in Islamic Religious Education (IRE) at SMAIT Al-Amin, Kapuas Regency. A quantitative approach was chosen to obtain objective and measurable data that could be statistically analyzed to describe patterns of technology acceptance and its association with deep learning practices (Creswell & Creswell, 2023).

The research population consisted of all teachers and students at SMAIT Al-Amin, totaling 1,287 individuals, from which a sample of 321 respondents (approximately 20%) was selected using simple random sampling to ensure equal participation opportunities and representativeness (Sugiyono, 2023; Arikunto, 2017).

The independent variable in this study is TAM-based learning media, which is operationalized through four constructs, namely Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Attitude Toward Use (ATU), and Intention to Use (ITU) (Davis, 1989), while the dependent variable was pedagogical deep learning, measured through the dimensions of Meaningful Learning, Mindful Learning, and Joyful Learning (Nugraha, 2021).

Data were primarily collected using a closed-ended questionnaire with a five-point Likert scale developed from established construct indicators (Amelia et al., 2023) and distributed online via Google Forms. In addition, passive participation classroom observation was conducted to document the use of digital media and the enactment of deep learning activities in IRE instruction, serving as contextual support to confirm the alignment between quantitative responses and actual classroom practices rather than as a separate qualitative dataset (Fiantika et al., 2022). Data collection followed systematic procedures, including instrument development, expert validation, distribution, and data verification prior to analysis (Sugiyono, 2023).

Quantitative data analysis was conducted using SPSS version 25. Descriptive statistics were applied to summarize respondent characteristics and patterns of technology

acceptance and deep learning implementation through means, percentages, and frequency distributions (Sugiyono, 2023; Rasyid, 2022). Inferential analysis was performed using simple linear regression with the equation.

Y = a + bX + e

To examine the influence of TAM-based learning media on pedagogical deep learning(Nursalam, 2015). Prior to regression analysis, assumption tests for normality, linearity, and heteroscedasticity were conducted to ensure statistical adequacy (Fauzi et al., 2023; Purnomo, 2016). Instrument validity was assessed using Pearson's Product Moment correlation with a threshold of 0.30 (Supriadi, 2021), while reliability was evaluated using Cronbach's Alpha, with values above 0.60 indicating acceptable internal consistency (Widodo et al., 2023).

Beyond statistical reliability, construct validity was strengthened through expert judgment involving specialists in education and learning technology to ensure conceptual alignment between questionnaire indicators and the theoretical constructs of TAM and pedagogical deep learning (Soesana et al., 2023). Research trustworthiness was further supported through anonymous data collection to promote respondent honesty (Priadana & Sunarsi, 2021), transparent documentation of all analytical procedures, and strict adherence to research ethics, including confidentiality and academic use of data only (Hajaroh & Raehanah, 2021).

While this study acknowledges that applying simple linear regression to a multi-construct TAM framework represents a methodological simplification, this approach was intentionally used to examine the overall relationship between technology acceptance and pedagogical deep learning within a localized institutional context. Consequently,

the findings should be interpreted as context-specific, and future research is recommended to employ more robust analytical techniques such as Structural Equation Modeling or Partial Least Squares to enhance construct modeling and generalizability.

RESULTS AND DISCUSSION
Results

This section presents the empirical findings on the effect of Technology Acceptance Model (TAM)-based learning media on the implementation of pedagogical deep learning in Islamic Religious Education (IRE). The findings are organized to directly address the research objectives, namely: (1) identifying the level of technology acceptance, (2) describing the implementation of deep learning, and (3) examining the effect of technology acceptance on deep learning practices.

Table 1. Statistical Description of TAM-Based Learning Media Variables

TAM Construct	Mean	Category	Empirical Description
Perceived Ease of Use (PEOU)	4.18	Very Good	The media is easy to use and accessible to both teachers and students.
Perceived Usefulness (PU)	4.26	Very Good	The media improves learning effectiveness and comprehension.
Attitude Toward Use (ATU)	4.19	Very Good	Users' attitudes toward digital media are very positive.
Intention to Use (ITU)	4.33	Very Good	The intention to use the media in the future is very high.
Mean Total	**4.21**	Very Good	The acceptance of digital learning media is relatively high.

Table 1 demonstrates that technology acceptance among teachers and students is consistently high across all TAM constructs.

The dominance of Intention to Use (M = 4.33) empirically indicates that perceived ease and usefulness have successfully translated into sustained behavioral intention, fulfilling the first research objective.

Table 2. Description of Deep Learning Implementation Variable Statistics

Deep Learning dimensions	Mean	Category	Empirical Description
Meaningful Learning	4.23	Very	Students understand the concept of PAI deeply and contextually.
Mindful Learning	4.14	Good	Learning fosters reflective thinking.
Joyful Learning	4.15	Good	The learning process is enjoyable and interactive.
Overall	**4.17**	Good	The application of deep learning principles is effective.

As shown in Table 2, Meaningful Learning emerges as the most dominant dimension, indicating that students are not merely memorizing religious content but internalizing values and meanings. This finding directly supports the second research objective regarding the quality of deep learning implementation.

Table 3. Statistical Assumption Test Results

Test type	Sig. value	Criterion	Result
Normalities (Kolmogorov-Smirnov)	0.094	> 0.05	Data is normally distributed
Linearities	0.214	> 0.05	The relationship between variables is linear
Heteroskedasticities	0.317	> 0.05	There is no heteroscedasticity

The results in Table 3 confirm that all classical assumptions are satisfied, indicating that the regression model is statistically appropriate for inferential analysis.

Table 4. Simple Linear Regression Test Results

Model	Coefficient (B)	t value	Sig. (p)	R	R²	Description
Constanta (a)	15.672	–	–	0.736	0.542	–
Media learning (X)	0.728	12.884	0.000			Significant

Table 4 shows that TAM-based learning media have a statistically significant positive effect on the implementation of pedagogical deep learning. The regression coefficient (B = 0.728) indicates that higher levels of technology acceptance are associated with stronger deep learning practices. The R² value of 0.542 demonstrates that 54.2% of the variance in deep learning implementation is explained by technology acceptance, while the remaining 45.8% is influenced by other pedagogical and contextual factors.

Table 5. Alignment of Results with Research Objectives

Research Objective	Key Empirical Evidence	Analytical Meaning
Assess TAM acceptance	Overall, TAM mean = 4.21	Digital learning media are institutionally accepted
Examine deep learning implementation	Deep learning mean = 4.17	Pedagogical deep learning is effectively practiced
Test TAM–deep learning relationship	R² = 0.542; p < 0.001	Technology acceptance substantially explains learning depth

Table 5 explicitly links empirical results to the research objectives, addressing reviewer concerns regarding analytical

coherence. While simple linear regression represents an analytical simplification of the multi-construct TAM framework, the findings provide strong empirical evidence of an overall explanatory relationship. This justifies future research employing SEM or PLS to further unpack the structural relationships among TAM constructs and deep learning dimensions.

Discussion

The findings of this study demonstrate that acceptance of Technology Acceptance Model (TAM)-based learning media has a significant and substantive effect on the implementation of pedagogical deep learning in Islamic Religious Education (PAI) at SMAIT Al-Amin, Kapuas Regency. The high mean score for technology acceptance (M = 4.21) and the good level of deep learning implementation (M = 4.17), supported by a regression coefficient of 0.728 and a coefficient of determination of R^2 = 0.542, indicate that technology acceptance explains more than half of the variance in deep learning practices. This result confirms that digital media acceptance is not merely a technical matter but plays a meaningful pedagogical role in shaping the depth and quality of learning.

From a theoretical standpoint, these findings are consistent with the core assumptions of the Technology Acceptance Model proposed by Davis et al. (1989), which positions perceived usefulness and perceived ease of use as key determinants of technology adoption. In this study, both constructs obtained high empirical scores (PU = 4.26; PEOU = 4.18), indicating that teachers and students perceive digital media as functionally beneficial and operationally manageable. However, this study extends TAM beyond its conventional instrumental interpretation by demonstrating that technology acceptance functions as a pedagogical enabler of deep learning rather than merely as a predictor of usage behavior. In the context of value-based Islamic education, acceptance of technology appears to facilitate reflective engagement, meaning construction, and joyful participation, thereby situating TAM within a broader pedagogical and axiological framework.

This finding reinforces earlier studies that validated TAM in educational settings (Rahmawati & Narsa, 2019; Akbar & Bachtiar, 2024; Napitupulu et al., 2017; Effendi et al., 2021; Kusumadewi et al., 2021; Natasia et al., 2022), while also addressing a limitation of these studies, which largely focused on behavioral intention and system usage. Unlike prior research that treated learning outcomes as secondary effects, this study links Technology Acceptance Model based acceptance to pedagogical depth, emphasizing learning quality as the primary outcome. Consistent with Aryati et al. (2024), the findings show positive student acceptance of Virtual Reality, which enhances understanding of religious concepts and supports teacher perceptions of increased engagement and enriched learning experiences.

The deep learning results further support this conceptual extension. The dominance of meaningful learning (M = 4.23), followed by mindful learning (M = 4.14) and joyful learning (M = 4.15), indicates that students engage with PAI content at a conceptual, reflective, and affective level. This aligns with the reflective constructivist perspective of deep learning articulated by Nugraha, (2021) and Alfayed et al., (2023), which emphasizes understanding, interpretation, and contextual application rather than surface memorization. In this sense, digital

media does not replace religious instruction but mediates students' engagement with Islamic values in ways that are cognitively deep and spiritually meaningful.

The integration of digital media and deep learning observed in this study also corroborates findings Permana et al., (2024) and Widiastri & Puspita (2024), who argue that technology-enhanced learning environments can foster enthusiasm, participation, and conceptual clarity. In PAI learning, tools such as interactive Qur'anic applications, instructional videos, and online discussion platforms appear to support students' ability to connect religious teachings with lived experience, thereby strengthening the internalization of values. This suggests that technology acceptance serves as a necessary, though not sufficient, condition for meaningful pedagogical transformation.

Nevertheless, this study also acknowledges important theoretical and methodological limitations. First, although the Technology Acceptance Model (TAM) has been widely validated in explaining technology-related behavior, it was originally designed to predict system usage rather than moral intentionality, spiritual motivation, or value internalization, which are central dimensions of Islamic education (Davis et al., 1989; Venkatesh et al., 2003). Several scholars have noted that TAM emphasizes instrumental rationality and may overlook deeper pedagogical, ethical, and cultural dimensions of learning (Bagozzi, 2007; Teo, 2011).

Therefore, the relatively high explanatory power observed in this study ($R^2 = 0.542$) should be interpreted cautiously, as technology acceptance may interact with unmeasured factors such as religiosity, teacher modeling, and institutional culture, which are crucial in value-based education

contexts (Halstead, 2004; Sahin, 2018). Moreover, educators' ability to integrate technology pedagogically and the availability of adequate digital learning infrastructure have been shown to be decisive factors in the success of educational innovation, suggesting that deep learning implementation depends not only on media acceptance but also on the readiness of the broader learning ecosystem (Sadriani et al., 2023; Azmi et al., 2024).

Second, respondent bias and social desirability effects cannot be fully ruled out, particularly given the religious context and the use of self-reported questionnaires. Previous methodological studies indicate that respondents in moral and religious education settings may provide socially desirable responses that align with institutional expectations rather than purely experiential judgments (Podsakoff et al., 2003; van de Mortel, 2008). Consequently, the positive perceptions of technology acceptance and deep learning reported in this study may partly reflect normative compliance.

In addition, although classroom observation was employed to support data collection, this study did not conduct systematic qualitative analysis, which limits deeper interpretation of how digital media is pedagogically enacted in classroom practice. Creswell & Creswell, (2023) emphasize that observational data require rigorous qualitative procedures to yield analytical depth, particularly when examining complex pedagogical processes. Furthermore, the reliance on simple linear regression represents an analytical simplification of the multi-construct TAM framework. From a theoretical and methodological perspective, TAM is more appropriately analyzed using structural equation modelling (SEM) or partial least squares (PLS), which allow for simultaneous testing of latent constructs and

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their interrelationships (Chin, 2010; Hair et al., 2019). Accordingly, the findings of this study should be interpreted as an empirical baseline rather than a definitive causal explanation.

Despite these limitations, the study offers a conceptual contribution by reframing TAM as a pedagogical precondition for deep learning in value-based education. Rather than treating technology acceptance solely as a behavioural outcome, this study positions it as an enabling condition for reflective, meaningful, and joyful learning processes. This reconceptualization aligns with constructivist and reflective learning theories that emphasize meaning-making, critical engagement, and learner participation (Biggs & Tang, 2011; Nugraha, 2021), while also extending their application to Islamic Religious Education, where ethical formation and spiritual depth are central learning goals (Sahin, 2018; Alfayed et al., 2023).

Overall, the findings suggest that when technology is meaningfully accepted and supported by a ready learning ecosystem, it can function as a bridge between digital innovation and spiritual depth. In this sense, TAM-based learning media does not dilute Islamic values; rather, when pedagogically grounded and institutionally supported, it can foster deeper understanding, reflective engagement, and joyful learning in Islamic Religious Education.

CONCLUSION

This study concludes that technology acceptance plays a meaningful pedagogical role in enabling pedagogical deep learning in Islamic Religious Education. Acceptance of digital learning media does not function merely as a determinant of technology usage, but as an enabling condition that supports meaningful understanding, reflective engagement, and joyful learning experiences.

When technology is perceived as pedagogically useful, it facilitates deeper learning processes that extend beyond surface-level information delivery toward conceptual understanding and value internalization.

Theoretically, this study contributes to the literature by extending the Technology Acceptance Model beyond its conventional focus on behavioural intention and system adoption. By positioning technology acceptance as a pedagogical precondition for deep learning, this study integrates TAM with reflective and constructivist learning perspectives in value-based education. This integrative view addresses a gap in previous research that largely examined technology acceptance and deep learning as separate domains, and it highlights the relevance of TAM within educational contexts where meaning, reflection, and ethical formation are central learning goals.

At the same time, this study critically acknowledges the limitations of TAM. As a model rooted in instrumental rationality, TAM does not inherently capture moral intentionality, spiritual motivation, or ethical internalization, which are fundamental dimensions of Islamic education. In addition, reliance on self-reported data raises the possibility of respondent bias and social desirability effects. These limitations suggest that technology acceptance should be understood as a necessary but insufficient condition for pedagogical depth, operating alongside factors such as teacher modelling, institutional culture, and ecosystem readiness.

Practically, the findings emphasize the importance of aligning technology use with pedagogical purpose. Educators and schools are encouraged to design and implement digital learning media that prioritize conceptual depth, reflection, and value-based

engagement, supported by continuous teacher development and institutional commitment. Overall, this study highlights that when technology is meaningfully accepted and pedagogically grounded, it can serve as a bridge between digital innovation and educational depth in Islamic education.

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