

Factors Influencing the Active Engagement of Undergraduate Students in Blended Learning

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ABSTRACT

Background and Objectives: This investigation identifies the multifaceted determinants facilitating active engagement among undergraduate students within blended learning environments at Islamic higher education institutions in Central Java, Indonesia. The transition to hybrid pedagogical models necessitates a deeper understanding of student behavior. Consequently, this research integrates the Technology Acceptance Model (Davis, 1989) and the Theory of Planned Behavior (Ajzen, 1991) into a unified framework to better explain student engagement. This integration analyzes how perceptions of technological ease and utility, alongside personal attitudes, social influences, and individual agency, collectively synthesize to form behavioral intentions that dictate actual participation levels in digital academic activities.

Methodology: The study employed a rigorous quantitative methodology using Partial Least Squares Structural Equation Modeling (PLS-SEM). Primary data were derived from a survey of 385 undergraduate respondents across various Islamic colleges in Central Java, selected through a systematic random sampling protocol. The research instrument utilized an adapted questionnaire validated by prior scholarship to ensure reliability. Data processing was executed using SmartPLS software, involving a two-stage evaluation. First, the measurement model was scrutinized for validity and internal consistency. Second, the structural model was assessed using a bootstrapping procedure to determine path coefficients and significance, maintaining a threshold of $p < 0.05$.

Main Results: The analytical results provided robust empirical support for all six proposed hypotheses. Specifically, findings revealed that perceived ease of use ($\beta = 0.391$, $p < 0.05$) and perceived utility ($\beta = 0.295$, $p < 0.05$) serve as significant precursors to student attitudes. Furthermore, these attitudes ($\beta = 0.600$, $p < 0.05$), combined with the influence of subjective norms ($\beta = 0.018$, $p < 0.05$) and perceived behavioral control ($\beta = 0.171$, $p < 0.05$), were instrumental in fostering behavioral intentions. The most substantial finding was the profound impact of behavioral intention on actual active engagement ($\beta = 0.697$, $p < 0.05$), acting as the

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primary driver of student participation. The overall model exhibited high explanatory power (R^2) and strong predictive relevance (Q^2), confirming its validity in this specific educational context.

Discussions: These findings validate the conceptual synergy between TAM and TPB, highlighting that engagement is a socio-psychological issue. The strong correlation between technological perceptions and attitude suggests that institutions must prioritize intuitive platforms. Moreover, the role of subjective norms reflects the unique communal and mentor-based learning culture inherent in Islamic institutions, where social pressure and teacher-student relationships significantly influence digital adoption. This underscores the need for a holistic approach to educational technology that considers both system design and social support structures.

Conclusions: While technical ease and utility are foundational, the cultivation of a positive attitude and a supportive social environment is what truly translates intention into proactive learning behavior. Institutions are encouraged to design mobile-friendly, accessible platforms and leverage the influential role of faculty to boost student confidence and participation. Limitations regarding self-reported data suggest that future research could benefit from longitudinal designs or the inclusion of objective log data to further refine these engagement dynamics.

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Introduction

Global disruptions, particularly the COVID-19 pandemic, have fundamentally reshaped the architecture of higher education. This period catalyzed a significant pedagogical transition, moving from conventional classroom settings to fully digital platforms, eventually stabilizing into hybrid or blended learning models (O'Dea & Stern, 2022). Blended learning is recognized as a modern instructional strategy that harmonizes the convenience of digital access with the interactive advantages of physical classrooms; furthermore, its capacity to enhance academic outcomes and offer scheduling flexibility has made this hybrid approach a favored method for both lecturers and learners (McKenzie et al., 2022). Consequently, the integration of blended learning has expanded rapidly across various academic sectors, including the specific landscape of Islamic higher education institutions in Central Java, Indonesia.

Although hybrid models are becoming more common, their efficacy is fundamentally dependent on the level of student involvement. Academic engagement—characterized by a student's intellectual curiosity, motivation, and emotional commitment—remains a vital predictor of educational achievement across all instructional formats (Bedi, 2023). In the specific context of blended learning, active engagement manifests as deliberate participation in collaborative dialogues, independent research, and interactive tasks, all of which are essential

for the success of this pedagogical model (Tang et al., 2023). Consequently, pinpointing the underlying drivers that motivate students to engage proactively is a prerequisite for developing resilient and impactful instructional frameworks.

Diverse theoretical lenses have been utilized in scholarly literature to investigate how technology is integrated into educational settings, with the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB) standing out as foundational frameworks. Since its inception by Davis (1989), TAM has suggested that the intent to adopt a system is rooted in the user's attitude, which is fundamentally shaped by how useful and user-friendly they perceive the technology to be. Within a hybrid learning environment, perceived ease of use signifies a student's expectation that navigating the platform will be seamless and require minimal exertion, whereas perceived usefulness captures the belief that such tools will directly boost academic productivity or outcomes. Existing empirical evidence consistently validates that these subjective assessments are critical in molding how students perceive and accept digital instructional resources (Bai & Jiang, 2024).

To provide a more comprehensive perspective, TPB, introduced by Ajzen (1991), offers additional insights into the social and psychological drivers of student behavior. The TPB framework posits that a person's motivation to act is driven by a combination of their personal attitude, subjective norms, and their sense of agency over the behavior (Ajzen, 2020). Applied to a hybrid educational setting, attitude represents the student's overall appraisal—whether favorable or unfavorable—of participating in blended instruction. Subjective norm encompasses the perceived social expectations or pressures from influential figures, such as peers or instructors. Meanwhile, perceived behavioral control reflects the student's confidence in their own capability to navigate the blended format and manage logistical challenges. A substantial body of research has utilized TPB to accurately forecast student intentions and actual participation within diverse digital learning ecosystems.

Although TAM and TPB have been widely applied individually, a growing body of literature advocates for their integration to provide a more comprehensive understanding of technology acceptance, especially in complex learning implementations such as blended learning (Tang et al., 2023). Conceptually, these two models are highly complementary; while TAM focuses on the utilitarian and technical aspects of a system, TPB addresses the social influences and individual agency that TAM often overlooks. By integrating them, this study enhances its explanatory power by capturing both the pragmatic value of the technology and the socio-psychological readiness of the user. Integrated models often yield stronger predictive power by capturing both intrinsic (e.g., perceived usefulness, perceived ease of use) and extrinsic (e.g., social influence, perceived control) factors that affect behaviour (Anthony et al., 2020). Research by Kharma et al. (2021) highlights the effectiveness of integrated models in predicting student acceptance of online learning. Similarly, studies by Anthony et al. (2020) have utilized combined frameworks to examine e-learning adoption in different cultural contexts. Porkodi and Tabash (2024) also emphasize the importance of comprehensive models for blended learning acceptance. Meanwhile, Amornrit et al. (2022) highlight blended learning in improving knowledge and skills.

Given the multifaceted nature of student engagement in blended learning and the diverse determinants of technology acceptance, this study aims to empirically examine the factors influencing undergraduate students' active engagement in blended learning through a comprehensive integration of the TAM and the TPB. Although integrated TAM and TPB models offer enhanced predictive power, their specific application in blended learning research remains

relatively limited. Furthermore, most existing studies tend to focus on technology usage intention rather than measuring actual active engagement. This study addresses this gap by shifting the focus from mere adoption intention to sustained behavioral participation, providing a clearer link between how students perceive a system and how they actually perform within it. Consequently, a significant gap still exists regarding how active engagement specifically manifests within the context of Islamic higher education institutions in Indonesia, where existing studies largely focus on general education or STEM fields, with limited attention to learning environments that possess unique sociocultural and pedagogical dimensions. Islamic higher education presents a distinct context where traditional pedagogical values, such as *Talaqqi* (direct mentorship) and strong communal bonds (*Mudaris-Talib*), may uniquely interact with digital autonomy, making the role of subjective norms and social pressure more pronounced compared to secular or general education settings.

Driven by these theoretical foundations, the present study evaluates the impact of behavioral intention on active participation in hybrid learning, alongside the formative roles of attitude, subjective norms, and perceived behavioral control. Furthermore, it examines how individual assessments of technological utility and simplicity of use act as catalysts for student attitudes. By situating this inquiry within the distinct landscape of Islamic higher education in Central Java, Indonesia, the research systematically maps the dynamics of student involvement. This effort enriches the current academic discourse by offering empirical validation for the integrated TAM-TPB framework as a robust predictor of proactive engagement. Ultimately, the insights gained here are intended to assist academic leaders and policymakers in refining blended learning ecosystems to maximize student immersion and success.

Review of Literature

Technology Acceptance Model (TAM)

As a prominent conceptual lens in technology adoption studies, the Technology Acceptance Model (TAM) offers a robust mechanism for forecasting how users embrace digital systems. Emerging from the Theory of Reasoned Action (TRA) and formalized by Davis (1989), this framework identifies two pivotal cognitive drivers perceived usefulness and perceived ease of use. In a hybrid pedagogical setting, the former represents a student's conviction that digital tools will optimize their academic output, while the latter signifies the anticipated simplicity and minimal effort required to navigate these platforms. From an Islamic pedagogical perspective, perceived usefulness transcends mere technical utility; it resonates with the ethical mandate of *ilm naf'i* (beneficial knowledge). In this context, technological adoption is viewed as a virtuous endeavor if the tools effectively support the quest for intellectual growth and scholarly proficiency. Consequently, the acceptance of blended learning systems is determined not only by their functional design but also by their perceived capacity to facilitate meaningful learning experiences.

Moreover, the TAM framework suggests that a user's evaluative stance—or attitude—toward a system is fundamentally constructed from their perceptions of its utility and operational simplicity. This internal attitude acts as a powerful catalyst for developing a behavioral intention to engage with the tool (Ohanu et al., 2022). Within this causal chain, such an intention serves as the critical precursor to the definitive adoption and practical application of the technology (Latifah et al., 2021). Although the model is parsimonious, its predictive accuracy remains

remarkably high across a wide array of digital platforms. In the realm of contemporary education, ongoing scholarly inquiries continue to validate TAM's enduring applicability in forecasting how learners will respond to and integrate emerging instructional technologies.

Theory of Planned Behavior (TPB)

Originating as an advancement of the Theory of Reasoned Action, the Theory of Planned Behavior (TPB) has become a cornerstone in social psychology for forecasting human conduct (Ajzen, 2020). According to the framework established by Ajzen (1991), the primary precursor to any action is the individual's intention, which is synthesized from three core elements: personal attitude, subjective norms, and perceived behavioral control. Within this model, attitude represents a person's favorable or unfavorable assessment of a specific activity. Subjective norms encompass the perceived external pressures from influential groups—such as family, colleagues, or mentors—to engage in a particular behavior (Anthony, 2020). In the specific milieu of Islamic higher education, these social influences are significantly amplified by the values of *jama'ah* (collectivity) and a profound reverence for the *mudaris* (educator). Here, the drive to participate in learning transcends simple social compliance; it is embedded in a communal religious duty to pursue knowledge collectively. Consequently, the endorsement of a lecturer and the shared motivation of the student community serve as powerful catalysts in molding a student's commitment to blended learning.

Additionally, perceived behavioral control (PBC) serves as the defining component that differentiates TPB from its predecessor, the Theory of Reasoned Action. This construct captures a person's evaluation of the ease or complexity involved in executing an action, alongside their confidence in navigating external factors that could either promote or obstruct the behavior (Ohanu et al., 2022). For the purposes of this research, PBC represents the students' self-assessed competence in balancing both the technical requirements and the academic rigors of a hybrid learning environment. Consequently, the TPB framework offers a robust lens for examining how personal convictions, social dynamics, and self-perceived agency converge to mold intentions and subsequent actions. Extensive literature has reaffirmed the capacity of TPB to forecast behavioral uptake across various domains, particularly in the adoption of digital and blended instructional systems (Zhang et al., 2022).

Active Engagement (AE)

Active engagement is a crucial, multifaceted construct essential for academic success and the formation of meaningful learning experiences (Sun et al., 2019). This concept encompasses the extent to which students are cognitively, emotionally, and behaviorally invested in learning activities (Bedi, 2023). In Islamic pedagogy, active engagement can be viewed through the lens of *Adab al-Alim wa al-Muta'allim* (the etiquette of the teacher and the learner), which emphasizes that a student must be proactive, disciplined, and sincere in their presence whether physically or digitally. Engagement is not just a technical participation but a manifestation of excellence, where students strive to provide their best effort in discussions and collaborative tasks as a form of moral and academic responsibility. In the context of blended learning, active engagement goes beyond passive participation, encouraging students to proactively participate in learning tasks, discussions, collaborations, and self-reflection. Given that blended learning necessitates greater autonomy and self-management from students through its online components, the level of active engagement becomes paramount for its

effectiveness. Manifestations of active engagement can include participation in online discussion forums, timely completion of assignments, attendance in synchronous sessions, and cognitive efforts to understand complex material and solve problems (Bedi, 2023). Increased active engagement not only leads to better learning outcomes but also fosters essential lifelong learning skills.

Hypothesis Development

Based on a comprehensive literature review of the TAM and the TPB, and their relevance in the context of blended learning, this study proposes several hypotheses examining the predictive relationships between variables. These hypotheses are designed to identify key factors influencing students' intention to actively engage in blended learning.

Influence of Perceived Ease of use on Attitude

The acceptance of technology is fundamentally predicated on the user's initial encounter; a seamless first interaction is essential for cultivating an optimistic outlook. Consistent with TAM's core principles, when learners find that blended learning interfaces and digital resources are intuitive and lack formidable technical hurdles, they are more likely to harbor favorable views toward the integrated educational model. Existing scholarship regularly emphasizes that the degree of user-friendliness directly shapes how individuals evaluate instructional systems. For instance, empirical work by Lin and Yu (2023) and To et al. (2019) demonstrated that the perceived simplicity of a system serves as a robust determinant of student mindset, implying that reduced complexity in technological interaction leads to a more supportive academic attitude. Guided by these insights, the study puts forward the following hypothesis:

H1: Perceived ease of use has a positive and significant influence on the attitude of blended learning students

Influence of Perceived Usefulness on Attitude

Users generally form optimistic perspectives toward technologies that are perceived as advantageous (Ohanu et al., 2022). Within the TAM framework, the utility of a system serves as a central catalyst for shaping these favorable mindsets. Learners who anticipate that hybrid instruction will yield substantive gains—such as heightened academic achievement, increased versatility in study schedules, or exposure to more diverse educational materials—are predisposed to view this pedagogical format favorably. This conviction regarding the system's value encourages students to perceive digital platforms as indispensable assets for reaching their educational goals. Extensive empirical research confirms that the perceived utility of a tool is a significant factor in fostering constructive outlooks toward digital integration in classrooms (Lin & Yu, 2023; To et al., 2019). In light of these considerations, the study offers the following hypothesis:

H2: Perceived usefulness has a positive and significant influence on the attitude of blended learning students

Influence of Attitude on Behavioral Intention

An individual's attitude reflects their internal evaluation of a specific behavior, which logically guides their intention to perform that behaviour (Bechler et al., 2021). This hypothesis is a cornerstone of the TPB and is also highly relevant in the context of TAM, universally stating that a positive attitude toward a behavior will directly increase the intention to perform it. When students hold a positive attitude towards blended learning, viewing it as an enjoyable, effective, or preferable learning experience, they will be more inclined to develop a strong intention to participate and actively engage in that learning environment. Studies by Lin and Yu (2023) and Anthony et al. (2020) for example, confirm that students' positive attitudes toward online learning significantly predict their intention to continue using it, even amidst the challenges of learning transitions. Based on this explanation, the following hypothesis is proposed:

H3: Attitude has a positive and significant influence on behavioral intention

Influence of Subjective Norm on Behavioral Intention

Human actions are frequently molded by a combination of internal convictions and the perceived expectations of one's social milieu. The TPB framework defines subjective norms as the pressure or anticipation an individual feels from influential figures—including colleagues, educators, and family members—regarding the execution of a specific behavior (Ajzen, 2020). In an academic setting, if students perceive that their peers, lecturers, or even parents support or expect them to participate in blended learning, their intention to engage in this modality will significantly increase. Within an educational atmosphere, students who sense that their social circle or academic mentors favor their participation in hybrid learning are more likely to demonstrate a heightened intent to engage. This dynamic is especially pronounced in Islamic academic settings, where the communal ethos and the heritage of *talaqqi* (direct transmission of knowledge) highlight the necessity of institutional validation and the sanctity of the teacher-student relationship. Such external social drivers serve as a pivotal force in the decision-making process for technological adoption, as evidenced by empirical findings from Anthony et al. (2020) and Zhang et al. (2022) in diverse cultural landscapes. Guided by this theoretical rationale, the study presents the following hypothesis:

H4: Subjective norm has a positive and significant influence on behavioral intention

Influence of Perceived Behavioral Control on Behavioral Intention

A person's conviction regarding their agency to manage their actions and navigate potential hurdles serves as a vital predictor of their intent to act. According to the TPB framework, perceived behavioral control (PBC) is a pivotal factor in establishing behavioral intention (Ajzen, 2020). This construct encapsulates an individual's confidence in their proficiency to execute a task and mitigate any impeding factors (Ohanu et al., 2022). Within the hybrid learning sphere, students who perceive themselves as possessing the necessary tools, competencies, and circumstances—such as reliable connectivity, technological fluency, and disciplined time allocation—demonstrate a heightened motivation to participate. Empirical findings by Mailizar et al. (2021) further substantiate that a strong sense of behavioral autonomy significantly reinforces a student's willingness to adopt digital learning platforms. Drawing upon this theoretical foundation, the study proposes the following hypothesis:

H5: Perceived behavioral control has a positive and significant influence on behavioral intention

Influence of Behavioral Intention on Active Engagement

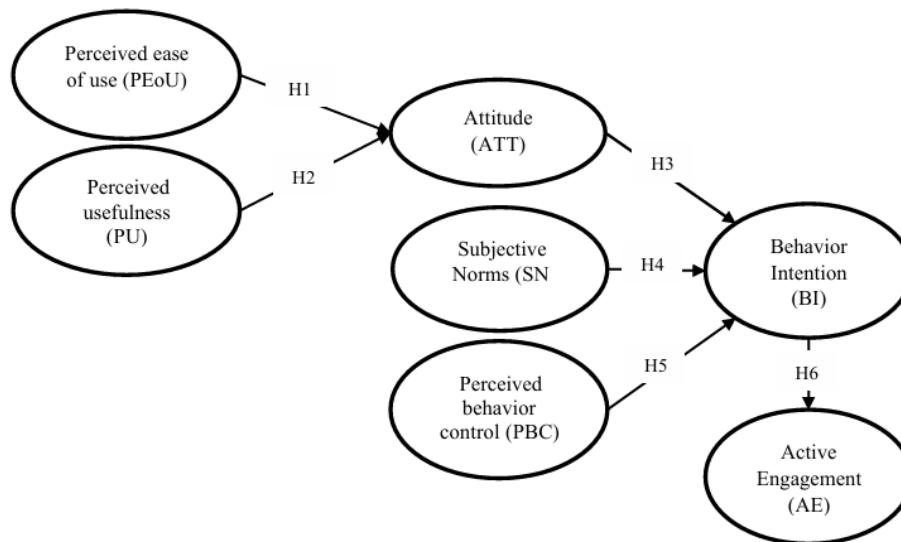
A strong behavioral intention to perform an action is the best predictor of actual behavior (Ajzen, 2020). This hypothesis is built upon the general principle that intention is a strong predictor of actual behavior, in this case, active engagement. In the context of this study, students' intention to participate in blended learning will not only lead to system acceptance but will also motivate students to actively engage in various aspects of learning. Students with a strong intention to use and leverage blended learning tend to exhibit proactive engagement behaviors, such as participating in online discussions, completing self-study tasks, and seeking interaction with materials and peers. When this intention is driven by a sense of *Amanah* (trust/responsibility) toward their education, it translates into a deeper, more sustained active engagement that goes beyond completing mandatory tasks. Research conducted by Heilporn et al. (2021) demonstrates that intention can effectively enhance student engagement in blended learning. Based on this explanation, the following hypothesis is proposed:

H6: Behavioral intention has a positive and significant influence on students' active engagement in blended learning.

Based on the hypothesis development, the proposed research model can be seen in Figure 1.

Figure 1

Research Model



Method

A quantitative research design, specifically utilizing a survey-based methodology, was implemented in this investigation. This methodological choice was dictated by the study's core aim: to rigorously evaluate causal linkages between pre-defined constructs and to facilitate the generalization of empirical results across a more extensive demographic. To gather data from a substantial respondent pool, a structured online instrument was deployed as the primary vehicle for data collection. This systematic framework ensured an objective and streamlined acquisition of information, which subsequently underwent rigorous statistical scrutiny to validate or refute the hypothesized relationships within the model.

Respondents

The target population for this research comprised undergraduate students enrolled in various Islamic higher education institutions across Central Java, Indonesia. To determine an appropriate sample size, the study adhered to the rigorous analytical standards of Partial Least Squares Structural Equation Modeling (PLS-SEM). Specifically, the Inverse Square Root Method as proposed by Kock and Hadaya (2018), was utilized to guarantee adequate statistical power; a cohort of 385 respondents was identified as more than sufficient for detecting minimum path coefficients within the 0.11 to 0.20 range at a 95% confidence interval. Moreover, this participation rate substantially surpasses the 10-times rule advocated by Hair et al. (2017), which mandates that the sample size should tenfold the maximum number of structural paths converging on a single latent variable. By securing 385 valid datasets, the investigation maintains high predictive precision and ensures a robust estimation of the structural model.

To ensure data relevance within the context of blended learning research, specific inclusion criteria were applied. Participants were required to have completed at least one full semester of undergraduate study. Consequently, the survey targeted students in their second semester or higher. This criterion was established to ensure that respondents had sufficient, long-term exposure to the blended learning ecosystem, allowing them to provide informed and reliable evaluations based on actual academic experience rather than initial impressions. To strictly enforce these criteria, a screening section was placed at the beginning of the online questionnaire, asking respondents to specify their current semester. Only students who confirmed they were in their second semester or beyond were permitted to complete the survey.

Instruments

Data acquisition was facilitated through a research instrument synthesized from established scholarly sources. The measurement of perceived ease of use and perceived usefulness involved four items each, drawn from the work of To et al. (2019). For the Attitude and behavioral intention constructs, six items were integrated based on the framework by Anthony et al. (2020). Furthermore, subjective norm was assessed using six indicators derived from Anthony et al. (2020) and Zhang et al. (2022), while perceived behavioral control utilized six items synthesized from Anthony et al. (2020) and Ohanu et al. (2022). To measure active engagement, the study incorporated four items developed from Sun et al. (2019). This instrument adopted a five-point Likert scale format, ranging from Strongly Disagree (1) to "Strongly Agree" (5). Prior to the primary data collection phase, a preliminary pilot study was conducted with 50 participants to verify the internal consistency and validity of the items. Crucially, these pilot participants were excluded from the final analytical sample of 385 to maintain the integrity of the results.

Procedures

Fieldwork for this investigation involved the administration of a digital survey instrument hosted on the Google Forms platform. Access to the questionnaire was facilitated via institutional communication networks, such as academic email directories and departmental instant messaging groups, to guarantee a broad representation across various disciplines. A probability-based random sampling strategy was implemented to ensure that all eligible undergraduate students within the Islamic higher education sector of Central Java possessed an equivalent probability of inclusion. The data acquisition phase spanned from June through December 2024. To safeguard the integrity of the data, technical constraints were applied to

prevent multiple entries from the same IP address, and any non-completed submissions were systematically purged from the final analysis. Furthermore, the procedural framework of this study was formally sanctioned by the Academic Ethics Committee of Sekolah Tinggi Agama Islam Syubbanul Wathon Magelang, thereby upholding rigorous ethical protocols and ensuring the confidentiality and rights of all participants.

Data Analysis

Prior to the analytical phase, the selection of Partial Least Squares Structural Equation Modeling (PLS-SEM) over Covariance-Based SEM (CB-SEM) was carefully justified. While PLS-SEM is renowned for its adaptability regarding sample size and non-normal distributions, its application in this study was primarily driven by the research's predictive focus on key constructs, namely behavioral intention and active participation. Furthermore, this method is particularly suitable for expanding the theoretical reach of TAM and TPB within a specialized pedagogical milieu. In contrast to the confirmatory nature of CB-SEM, the PLS approach excels in pinpointing dominant predictor variables and optimizing the explained variance (R^2) within endogenous latent constructs (Hair et al., 2019; Dash & Paul, 2021).

The empirical data underwent processing via the PLS-SEM framework utilizing the SmartPLS software. The analytical procedure was divided into two fundamental phases: the assessment of the measurement (outer) model and the structural (inner) model (Sarstedt et al., 2020). The measurement model was evaluated to ensure the psychometric integrity of the research instrument. This phase involved a rigorous check of convergent validity through outer loading magnitudes and Average Variance Extracted (AVE), alongside an examination of discriminant validity using the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio. Additionally, internal consistency was verified through Composite Reliability and Cronbach's Alpha metrics (Hair et al., 2019). Subsequently, the structural model was examined for the purpose of hypothesis testing. This involved calculating path coefficients (β), t-statistics, and p-values to determine the strength and significance of the proposed relationships. To further evaluate the model's performance, R^2 values were analyzed to gauge predictive power, while Q^2 values were utilized to confirm predictive relevance (Sarstedt et al., 2022).

Findings and Discussion

Profile of Respondent

This study involved a total of 385 student respondents. In terms of gender, the majority of respondents were male (59.48%), while females comprised 40.52%. For age distribution, the 20–25 year age group dominated with 52.21% of respondents, followed by the group aged less than 20 years (25.45%). The complete profile of the study respondents can be seen in Table 1.

Table 1*Profile of Respondent*

	Category	Number	(%)
Gender	Female	156	40.52%
	Male	229	59.48%
	Total	385	100.00%
Age	Less than 20 Years	98	25.45%
	20 - 25 Years	201	52.21%
	26 - 30 Years	74	19.22%
	More than 30 Years	12	3.12%
	Total	385	100.00%
Semester	Semester 1	52	13.51%
	Semester 3	102	26.49%
	Semester 5	162	42.08%
	Semester 7	48	12.47%
	More than semester 7	21	5.45%
	Total	385	100.00%

Source: Primary data, 2025

Outer Model Evaluation**Convergent Validity**

To verify that the selected indicators effectively represent their respective latent variables, an assessment of convergent validity was performed. This process ensures a strong positive correlation between the items and the underlying constructs they aim to quantify. Evaluation of this validity relied on two primary metrics: standardized loading factors and Average Variance Extracted (AVE) scores. A comprehensive summary of these convergent validity findings is documented in Table 2.

Table 2*Convergent Validity Result*

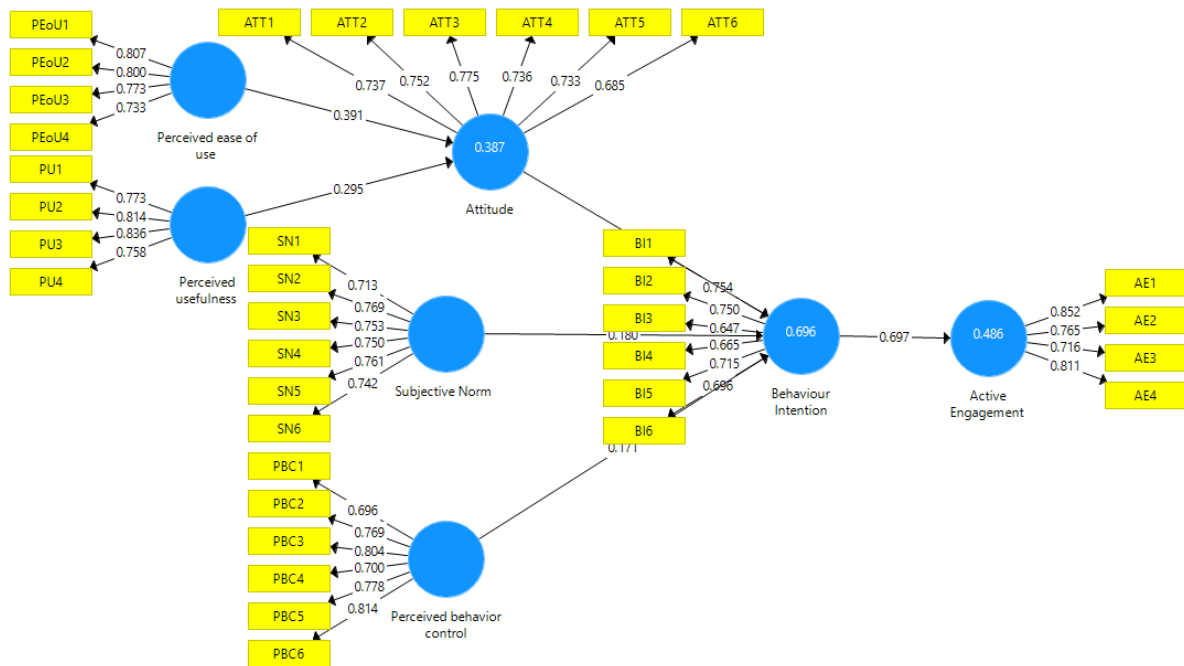
Construct	Code	Loading Factor	AVE
Perceived ease of use (PEoU)	PEoU1	0.807	0.606
	PEoU2	0.800	
	PEoU3	0.773	
	PEoU4	0.733	
Perceived usefulness (PU)	PU1	0.773	0.634
	PU2	0.814	
	PU3	0.836	
	PU4	0.758	
Attitude (ATT)	ATT1	0.737	0.543
	ATT2	0.752	
	ATT3	0.775	

Table 3*(Cont.)*

Construct	Code	Loading Factor	AVE
	ATT4	0.736	
	ATT5	0.733	
	ATT6	0.685	
Subjective Norm (SN)	SN1	0.713	0.560
	SN2	0.769	
	SN3	0.753	
	SN4	0.750	
	SN5	0.761	
	SN6	0.742	
Perceived behavior control (PBC)	PBC1	0.696	0.580
	PBC2	0.769	
	PBC3	0.804	
	PBC4	0.700	
	PBC5	0.778	
	PBC6	0.814	
Behaviour Intention (BI)	BI1	0.754	0.528
	BI2	0.750	
	BI3	0.647	
	BI4	0.665	
	BI5	0.715	
	BI6	0.696	
Active Engagement (AE)	AE1	0.852	0.620
	AE2	0.765	
	AE3	0.716	
	AE4	0.811	

Source: Smart PLS Output, 2025

As shown in Table 2, while most indicators exceed the 0.7 threshold, a few items (ATT6, PBC1, BI3, BI4, BI6) show loadings between 0.647 and 0.696. These indicators were retained rather than deleted for several reasons. First, their removal did not lead to a significant increase in Composite Reliability or AVE beyond the recommended thresholds. Second, these items carry essential theoretical content for the Islamic higher education context, and removing them would diminish the content validity of the constructs. According to Hair et al. (2019), indicators with loadings between 0.40 and 0.70 should only be removed if their deletion significantly improves the AVE and Composite Reliability. Since all constructs already exceed the 0.5 AVE and 0.7 CR thresholds, the impact on construct validity remains robust.

Figure 2*Final Research Model*

Source: Smart PLS Output, 2025

Discriminant Validity

To ensure that each latent variable is statistically unique and captures phenomena not represented by other constructs in the framework, an analysis of discriminant validity was conducted. This study employed a dual-criterion approach to establish this uniqueness: the traditional Fornell-Larcker matrix and the more contemporary Heterotrait-Monotrait (HTMT) ratio (Henseler et al., 2015). By utilizing both techniques, the research ensures a more rigorous verification of the model's empirical distinctiveness.

Table 4*Discriminant Validity with Fornell-Larcker Criterion*

Construct	AE	ATT	BI	PBC	PEoU	PU	SN
Active Engagement (AE)	0.788						
Attitude (ATT)	0.601	0.737					
Behaviour Intention (BI)	0.697	0.640	0.706				
Perceived behavior control (PBC)	0.552	0.604	0.620	0.762			
Perceived ease of use (PEoU)	0.532	0.578	0.596	0.490	0.779		
Perceived usefulness (PU)	0.495	0.543	0.640	0.577	0.633	0.796	
Subjective Norm (SN)	0.500	0.559	0.597	0.480	0.405	0.476	0.748

Source: Smart PLS Output, 2025

The outcomes of the discriminant validity assessment, as determined by the Fornell-Larcker Criterion, are detailed in Table 3. Adherence to this standard requires that the square root of the Average Variance Extracted (AVE)—positioned along the table's primary diagonal—surpasses any correlation coefficients shared with other latent variables in the same row or column. Observations from Table 3 reveal that the square root AVE values (for instance, 0.788 for active engagement and 0.737 for attitude) are uniformly greater than the cross-correlation figures. These findings provide solid empirical evidence that the Fornell-Larcker requirements are satisfied, thereby validating that each construct within the structural model represents a unique and independent concept.

Table 5

Discriminant Validity with HTMT

Construct	AE	ATT	BI	PBC	PEoU	PU	SN
Active Engagement (AE)							
Attitude (ATT)	0.605						
Behaviour Intention (BI)	0.815	0.804					
Perceived behavior control (PBC)	0.665	0.709	0.750				
Perceived ease of use (PEoU)	0.672	0.710	0.747	0.597			
Perceived usefulness (PU)	0.610	0.653	0.800	0.686	0.801		
Subjective Norm (SN)	0.599	0.656	0.702	0.544	0.486	0.558	

Source: Smart PLS Output, 2025

Discriminant validity was further verified using the Heterotrait-Monotrait (HTMT) ratio, with the results documented in Table 4. Methodological standards dictate that for a model to exhibit distinctiveness, HTMT ratios must remain under the conservative ceiling of 0.85. Data presented in Table 4 indicate that all inter-construct HTMT values in this research fall safely below this 0.85 benchmark (Franke & Sarstedt, 2019). The convergent evidence provided by both the HTMT analysis and the preceding Fornell-Larcker test reinforces the conclusion that the measurement model attains a high level of empirical differentiation.

Composite Reliability

The internal consistency of the research instrument was examined to ensure that the indicators for each latent variable remain cohesive in measuring their respective concepts. Within the PLS-SEM framework, this study employed two foundational indices for reliability assessment: Cronbach's Alpha and Composite Reliability. Both parameters serve as gauges for a construct's stability, where a score exceeding the 0.70 threshold is widely accepted as evidence of robust internal reliability (Hair et al., 2019). Detailed outcomes regarding these reliability coefficients, specifically the Composite Reliability values, are compiled in Table 5.

Table 6*Composite Reliability*

Variable	Cronbach's Alpha	Composite Reliability
Active Engagement	0.794	0.867
Attitude	0.832	0.877
Behaviour Intention	0.800	0.856
Perceived behavior control	0.854	0.892
Perceived ease of use	0.783	0.860
Perceived usefulness	0.807	0.873
Subjective Norm	0.846	0.884

Source: Smart PLS Output, 2025

The empirical evidence presented in Table 5 confirms that every construct within the proposed model exhibits superior reliability. Specifically, the Cronbach's Alpha scores for all latent variables—including active engagement (0.794), attitude (0.832), behavioral intention (0.800), PBC (0.854), PEoU (0.783), PU (0.807), and SN (0.846)—surpass the mandated 0.70 benchmark by a considerable margin. In a complementary fashion, the Composite Reliability (CR) indices, which span from 0.856 for behavioral intention to 0.892 for PBC, also maintain values significantly higher than the 0.70 requirement. This uniformity across both metrics underscores the psychometric stability of the instrument, ensuring that each set of indicators consistently captures its intended latent dimension. Consequently, the research tools employed here are deemed both robust and highly dependable for further structural analysis.

Inner Model Evaluation

Following the confirmation of the measurement model's psychometric integrity, the analysis proceeded to the evaluation of the structural model (Inner Model). The objective of this phase is to rigorously examine the hypothesized causal linkages between the latent variables established in the theoretical framework. This assessment was executed through a systematic review of path coefficients (β), t-statistics, and p-values, all of which were derived from the bootstrapping algorithm within the PLS-SEM environment. Statistical significance was determined based on a p-value threshold of less than 0.05, corresponding to a 95% confidence interval (Hair et al., 2019). The synthesized outcomes of the direct path analysis conducted in this investigation are documented in Table 6.

Table 7*Hypothesis Test*

Hypothesis	Original Sample	T Statistics	P Values	Decision
H1: Perceived ease of use -> Attitude	0.391	6.850	0.000	Supported
H2: Perceived usefulness -> Attitude	0.295	5.427	0.000	Supported
H3: Attitude -> Behavior Intention	0.600	18.196	0.000	Supported
H4: Subjective Norms -> Behavior Intention	0.018	5.173	0.000	Supported

Table 8

(Cont.)

	Hypothesis	Original Sample	T Statistics	P Values	Decision
H5:	Perceived behavior control -> Behavior Intention	0.171	4.586	0.000	Supported
H6:	Behavior Intention -> Active Engagement	0.697	28.045	0.000	Supported

Source: Smart PLS Output, 2025

The path coefficients (β) in Table 6 reveal varying degrees of practical impact. behavioral intention ($\beta = 0.697$) and attitude ($\beta = 0.600$) demonstrate the strongest practical effects, suggesting that psychological readiness and internal evaluation are the primary drivers of engagement. In contrast, while subjective norms ($\beta = 0.018$) is statistically significant ($p < 0.05$), its practical impact is considerably limited due to the very small coefficient. This indicates that while social pressure from peers and lecturers exists, it is not the dominant factor in determining a student's intention compared to their personal attitude or technical perceptions. Perceived ease of use ($\beta = 0.391$) shows a moderate practical effect, surpassing perceived usefulness ($\beta = 0.295$), implying that for these students, the simplicity of the blended learning platform is more influential in forming their attitude than its perceived long-term benefits.

R-squared and Q-squared

Subsequent to the hypothesis testing phase, the structural model was evaluated to determine its explanatory power and its capacity for predictive relevance regarding the dependent constructs. Within the PLS-SEM paradigm, these qualities are primarily gauged through two critical indices: the coefficient of determination (R^2) and the cross-validated redundancy (Q^2). The empirical results for these metrics, applied to the model's endogenous variables, are detailed in Table 8 (Hair et al., 2019).

Table 9

R Square and Q Square

Correlations	R Square	Q Square
Perceived ease of use -> Attitude	0.387	0.206
Perceived usefulness -> Attitude		
Attitude -> Behavior Intention	0.696	0.332
Subjective Norms -> Behavior Intention		
Self perceived behavior control -> Behavior Intention	0.486	0.293
Behavior Intention -> Active Engagement		

Source: Smart PLS Output, 2025

The structural model evaluation detailed in Table 8 highlights the predictive proficiency concerning the study's endogenous constructs. The derived R^2 coefficients illustrate the percentage of variance within the dependent variables accounted for by their respective

antecedents. Specifically, the R^2 for attitude stands at 0.387, implying that 38.7% of the fluctuations in students' perspectives toward blended learning are driven by perceived ease of use and usefulness. Moreover, the R^2 for behavioral intention attained a substantial 0.696, indicating that the collective synergy of attitude, subjective norms, and perceived behavioral control explains 69.6% of its variance. Lastly, active engagement yielded an R^2 of 0.486, suggesting that behavioral intention alone clarifies nearly half (48.6%) of the variance in students' actual involvement in hybrid learning environments.

Beyond explanatory power, the model's predictive relevance was scrutinized using Q^2 statistics, frequently referred to as Stone–Geisser's Q^2 . A Q^2 coefficient exceeding the zero threshold signifies that the model possesses the capacity to forecast observed data points outside the initial estimation sample. Within this framework, the Q^2 values were calculated as 0.206 for attitude, 0.332 for behavioral intention, and 0.293 for active engagement. Given that all Q^2 outputs remain decidedly positive, it is concluded that the proposed model demonstrates robust predictive relevance in characterizing student acceptance and proactive participation within the blended learning landscape.

Discussion

Influence of Perceived Ease of Use on Attitude

The empirical analysis reveals that perceived ease of use (PEoU) exerts a substantial and positive influence on students' attitudes ($\beta = 0.391$, $p < 0.05$). A noteworthy observation in this research is that the impact of usability outweighs that of perceived usefulness ($\beta = 0.295$). This implies that for undergraduates within the Islamic higher education sector in Central Java, the intuitive nature and simplicity of a platform are more pivotal in shaping their disposition than the perceived academic advantages. This phenomenon likely stems from the transitional phase of blended learning adoption in these specific institutions, where infrastructural hurdles remain prevalent. Consequently, a system that facilitates seamless navigation serves to mitigate cognitive fatigue and the technical frustration typically associated with digital transitions. These findings provide compelling evidence that the effortlessness with which students interact with technological platforms is a cornerstone in fostering a favorable outlook toward hybrid modalities. When the digital interface demands minimal cognitive or physical exertion, students naturally develop a more positive inclination toward the educational experience. From a theoretical standpoint, these results reinforce the core tenets of the Technology Acceptance Model (TAM), which identifies PEoU as a primary and direct precursor to technological attitudes.

Furthermore, this investigation resonates with established literature, such as the works of Lin & Yu (2023) and To et al. (2019), which consistently validate PEoU as a dominant predictor of student sentiment in digital environments. Practically, these insights necessitate a strategic shift for educational institutions toward mobile-first and low-barrier designs. Given the Indonesian landscape—where smartphones are the primary gateway to academic content—platforms must be optimized for low-bandwidth environments, featuring mobile-responsive layouts and offline functionalities. By prioritizing intuitive interface design and robust technical assistance, institutions can lower the threshold of technical resistance, thereby nurturing positive student attitudes and securing long-term engagement in blended learning ecosystems.

Influence of Perceived Usefulness on Attitude

The research findings offer empirical validation that perceived usefulness (PU) statistically exerts a meaningful positive influence on student attitudes ($\beta = 0.295, p < 0.05$). This result underscores that as students recognize blended learning as a catalyst for academic excellence and pedagogical flexibility, they develop a more favorable evaluation of the modality. When students identify these digital tools as effective instruments for attaining both personal and professional milestones, their motivation to embrace the system intensifies. Consequently, this study reaffirms the Technology Acceptance Model (TAM), which designates perceived usefulness as a fundamental, and frequently the most decisive, predictor of technological disposition.

This outcome is consistent with established literature identifying perceived utility as a paramount factor in determining user attitudes toward educational technology. Specifically, this study mirrors the findings of Lin and Yu (2023) and To et al. (2019), who demonstrated that the perceived functional value of e-learning systems is a potent driver of student sentiment. From a practical standpoint, these insights emphasize that educational institutions must go beyond mere implementation; they must actively showcase the tangible advantages of hybrid learning. Curricula and instructional activities should be meticulously crafted to leverage blended learning in a way that visibly enhances learning outcomes. When students internalize these benefits through direct experience, it cultivates a sustainable positive attitude and promotes broader adoption. In the specific milieu of Islamic higher education, the utility of technology should be harmonized with the traditional concept of *Barakah* (blessing) in the pursuit of knowledge. Technology ought to be framed as a modern vehicle that renders the sacred endeavor of learning more efficient and reachable, preserving its spiritual essence while optimizing its practical delivery. By presenting digital tools as a means to facilitate easier access to wisdom, institutions can bridge the gap between traditional values and modern educational demands.

Influence of Attitude on Behavioral Intention

Analysis indicates that attitude has a significant and positive influence on behavioral intention ($\beta = 0.600, p < 0.05$). This finding strongly confirms the central and dominant role of individual attitudes in influencing their intention to perform a behavior. Students who hold a positive attitude towards blended learning, such as viewing it as an enjoyable or effective learning experience, tend to have a much stronger intention to adopt, participate in, and continue to engage with blended learning. This attitude serves as an internal evaluation that guides an individual's decision to behave.

From a theoretical perspective, these results substantiate the integrated tenets of the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB), both of which identify attitude as a primary and most influential determinant of behavioral intentions. This outcome corroborates an extensive body of empirical literature; specifically, the work of Lin & Yu (2023) and Anthony et al. (2020) reinforces the notion that a favorable disposition toward digital learning environments serves as a potent catalyst for a student's commitment to sustained usage. The practical implication is that efforts to cultivate positive student attitudes through enjoyable, relevant, and successful learning experiences are a key strategy to encourage their intention to adopt blended learning. Educators should focus on creating engaging and satisfying learning experiences to foster conducive attitudes.

Influence of Subjective Norm on Behavioral Intention

Subjective norm was found to have a significant positive influence on behavioral intention ($\beta = 0.018, p < 0.05$). While the coefficient is small, its significance in an Islamic institutional setting is noteworthy. This highlights the teacher-centric culture where the relationship between *Mudaris* (teacher) and student is highly influential. In these institutions, a student's intention is often shaped by the exemplary behavior of their lecturers. When a lecturer actively encourages and models the use of digital platforms, students perceive it as a normative academic duty. This relationship can be leveraged by training faculty members not just as instructors, but as digital role models who bridge the gap between traditional values and modern engagement. Although the path coefficient is relatively small, its statistical significance indicates that social pressure or support from significant others, such as peers, lecturers, or even family, significantly impacts students' intention to participate in blended learning. This suggests that perceptions of what is expected or approved by the social environment can play a role in shaping individual decisions, even if it may not be as strong as internal factors like attitude. Theoretically, this result affirms the relevance of subjective norm as an important component in the TPB, though it's worth noting that the strength of its impact can vary significantly across cultural and behavioral contexts.

These findings align with several prior studies that found social influence can be a driving factor in the intention to adopt educational technology, particularly in environments that emphasize collaboration or group norms. For example, studies by Anthony et al. (2020) and Zhang et al. (2022) examined the impact of subjective norms on e-learning adoption in various cultural contexts and found a significant influence. Practically, institutions can leverage these findings by building supportive learning communities and fostering positive interactions among students. Furthermore, involving lecturers as role models who actively support and recommend blended learning can create an environment where participation in blended learning is seen as a normative and socially supported behavior, indirectly encouraging student intention.

Influence of Perceived Behavioral Control on Behavioral Intention

The results demonstrate that perceived behavioral control (PBC) exerts a meaningful positive influence on behavioral intention ($\beta = 0.171, p < 0.05$). This finding suggests that students' internal convictions regarding their capacity to navigate the blended learning landscape specifically in managing academic workloads, troubleshooting technical disruptions, and optimizing time allocation serve as a significant catalyst for their intent to participate. This sense of agency fosters a degree of self-assurance and autonomy, which in turn inspires students to proactively engage within digital learning frameworks. Theoretically, this outcome bolsters the TPB, validating that the perception of mastery over a specific behavior is a fundamental driver of the commitment to perform it.

These observations align with established literature which posits that self-efficacy and volitional control are vital for the adoption of educational technologies. Specifically, the work of Mailizar et al. (2021) concerning e-learning in the Indonesian context reinforces the notion that PBC is a critical determinant of a student's intention to utilize hybrid systems. From a practical standpoint, institutional support must extend beyond the mere provision of hardware; there is a strategic necessity to cultivate student self-confidence. This can be operationalized through the development of localized, step-by-step instructional guides and the formation of peer-mentoring networks. Such initiatives resonate deeply with the communal learning values (*Jama'ah*) inherent in Islamic education, allowing students to surmount technical hurdles through collective

support. Furthermore, comprehensive orientation programs and consistent academic-technical assistance can empower students with the self-management skills required to excel in autonomous, technology-mediated environments.

Influence of Behavioral Intention on Active Engagement in Blended Learning

Behavioral intention has a significant positive influence on students' active engagement in blended learning ($\beta = 0.697, p < 0.05$). The strong path coefficient ($\beta = 0.697$) indicates that once the intention is formed, students in this context are highly likely to follow through with active participation. This suggests that the engagement gap in Islamic education is not due to a lack of student will, but rather depends on how well the preceding factors—attitude, social support, and control—are managed by the institution. This finding confirms that a strong intention to participate in blended learning directly translates into a higher level of active engagement among students. This result indicates that when students have a strong desire to adopt this learning model, they not only accept it but also proactively participate in various activities that constitute active engagement.

From a theoretical perspective, these outcomes substantiate the core postulate of the TPB, which identifies intention as the most robust predictor of manifested behavior. For scholarly discourse, this underscores the necessity of utilizing behavioral intention as a reliable proxy for assessing substantive engagement. Furthermore, it validates the premise that instructional frameworks designed to stimulate student intent are instrumental in driving deeper involvement in hybrid educational settings. These findings mirror the conclusions of Heilporn et al. (2021), whose work demonstrates that intention acts as a powerful catalyst for amplifying student participation within blended learning modalities.

The practical ramifications of this relationship are crucial for enhancing active engagement in blended learning environments. Academic institutions must prioritize strategies that nurture positive student intentions by addressing the multifaceted antecedents—attitude, social influence (subjective norms), and perceived agency—delineated in this research model. By strategically cultivating a strong sense of purpose and intent, institutions can indirectly foster a more immersive environment characterized by heightened participation and more frequent academic interactions. In essence, focusing on the will to engage is the most effective pathway to securing the act of engagement itself.

Conclusion

This research offers compelling empirical testimony that student involvement in hybrid educational settings is propelled by a sophisticated synergy of technical appraisals and socio-psychological dynamics. The confirmation of all six hypothesized paths underscores behavioral intention as the fundamental conduit that converts internal cognitive appraisals into tangible, proactive engagement. Notably, attitude was identified as the paramount driver of intent, largely catalyzed by the perceived ease of use of the digital infrastructure. Although subjective norms and perceived behavioral control were statistically significant, the findings imply that personal motivation and technical self-assurance are the primary catalysts for engagement within the investigated Islamic higher education milieu.

From a theoretical standpoint, this investigation affirms the robustness of integrating TAM and TPB, proving that this unified framework possesses superior explanatory strength for

actual behavior beyond simple technology adoption. In practical terms, academic institutions are urged to prioritize mobile-centric and frictionless interface designs to minimize user resistance. Furthermore, by capitalizing on the culturally significant *Mudaris-Talib* (teacher-student) bond, institutions can fortify the social fabric that encourages a culture of participatory learning. By addressing these multifaceted determinants, educators can cultivate a more resilient and immersive blended learning ecosystem that aligns with both modern pedagogical standards and traditional values.

Limitations and Future Research

Notwithstanding its contributions, this investigation is subject to several methodological constraints. Initially, the reliance on self-administered online surveys potentially invites social desirability bias, a phenomenon wherein participants may inadvertently inflate their reported levels of proactive engagement. Furthermore, the cross-sectional nature of this research provides a temporal snapshot of student perceptions, thereby constraining the capacity to establish definitive trajectories regarding how engagement evolves as students gain longitudinal experience with blended learning. Lastly, while the emphasis on Islamic higher education offers specialized contextual depth, the transferability of these results to vastly different cultural landscapes or secular academic frameworks may be limited, necessitating caution when generalizing the findings.

Future studies should consider employing longitudinal designs to observe how active engagement fluctuates across multiple semesters. To reduce the limitations of self-reporting, subsequent research could integrate objective data, such as Learning Management System (LMS) analytics, to measure actual participation levels. Furthermore, exploring potential moderating variables, such as digital literacy, gender, or religious-cultural values (e.g., the degree of *Talaqqi* orientation), could provide a more nuanced understanding of why certain predictors are more influential than others. Lastly, applying this integrated TAM-TPB model to other specialized educational contexts would help test its cross-cultural robustness.

Author Contributions

M: contributed to the conceptualization, writing of the original draft, and supervision of the study. DP: was responsible for validation, formal analysis, investigation, and resources. P: performed the data analysis using SmartPLS software and was responsible for visualization, project administration, and funding acquisition. All authors contributed to the methodology, participated in writing – review and editing, and have read and agreed to the published version of the manuscript.

Declaration of the Use of Generative AI

During the preparation of this manuscript, the authors used Gemini 3 Flash (AI Language Model) to assist with language editing and polishing of the draft. The tool was used solely to improve clarity, grammar, and overall readability. The authors reviewed and revised the output as necessary and take full responsibility for the content of the manuscript.

Ethics

This study received ethical approval from the Academic Ethics Commission of Institut Agama Islam Syubbanul Wathon Magelang (formerly Sekolah Tinggi Agama Islam Syubbanul Wathon Magelang), Approval No. 689/KE.01/SK/III/2024.

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