

How Religious Ethics-Based Problem-Based Learning Shapes Learning Motivation and Academic Discipline: The Mediating Role of Self-Regulation

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Abstract

Higher education increasingly requires learning models that strengthen not only cognitive competence but also students' ethical responsibility, self-management, motivation, and academic discipline. This study examined the structural relationships among religious ethics-based Problem-Based Learning, self-regulation, learning motivation, and academic discipline, with self-regulation positioned as a mediating variable. A quantitative explanatory design with a time-lagged survey was employed involving 151 undergraduate students from a Faculty of Education during the 2025 odd semester. Data were collected using validated Likert-scale instruments and analyzed through covariance-based Structural Equation Modeling. The measurement model demonstrated adequate reliability and convergent validity, with standardized factor loadings ranging from 0.63 to 0.86, composite reliability values above 0.70, and average variance extracted values above 0.50. The structural model showed satisfactory fit, $\chi^2(248) = 407.18$, CFI = 0.952, TLI = 0.945, RMSEA = 0.065, and SRMR = 0.063. Religious ethics-based Problem-Based Learning significantly predicted self-regulation ($\beta = 0.62$, $p < 0.001$), learning motivation ($\beta = 0.20$, $p = 0.026$), and academic discipline ($\beta = 0.17$, $p = 0.033$). Self-regulation significantly predicted learning motivation ($\beta = 0.56$, $p < 0.001$) and academic discipline ($\beta = 0.63$, $p < 0.001$), while partially mediating both relationships. The model explained 38% of the variance in self-regulation, 51% in learning motivation, and 56% in academic discipline. These findings indicate that religious ethics-based Problem-Based Learning contributes to academic outcomes primarily by strengthening students' capacity to regulate their learning responsibly.

Keywords: Academic Discipline; Learning Motivation; Problem-Based Learning; Religious Ethics; Self-Regulation; Structural Equation Modeling.



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INTRODUCTION

Digital transformation and the increasing adoption of artificial intelligence have become global phenomena that are reshaping teaching and learning processes in higher education. These technologies expand access to knowledge and provide greater flexibility in learning; however, they also raise concerns regarding technological dependency, plagiarism, academic integrity, and the irresponsible use of information. A global survey conducted by UNESCO reported that approximately two-thirds of higher education institutions had either established or were developing guidelines for the use of artificial intelligence, while one in four institutions indicated that they had encountered ethical issues associated with the technology (Marín et al., 2025; McCradden et al., 2020; Wangmo et al., 2019). These developments do not necessarily demonstrate that technology directly diminishes student discipline; rather, they underscore the growing importance of motivation, self-regulation, and academic responsibility. Self-regulation plays a critical role in enabling students to set learning goals, manage appropriate strategies, monitor their progress, and sustain engagement in online and blended learning environments (Kougiumtzidou et al., 2026; Ren et al., 2026; Sohail et al., 2026).

Among university students, particularly those engaged in online and blended learning, the demands of managing time, sustaining motivation, and independently fulfilling academic responsibilities have become increasingly substantial. A review of 163 studies demonstrated that student success in such learning environments is closely associated with the ability to set goals, select appropriate strategies, manage time effectively, monitor progress, and evaluate the learning process (Wang et al., 2026). Students who experience difficulties in regulating their learning strategies, effort, and study time are also more susceptible to academic procrastination, which may impede task completion and academic achievement (Aldhi et al., 2026; Balkis et al., 2013). These findings suggest that challenges related to student motivation and academic discipline cannot be attributed solely to individual willingness; they are also shaped by students' self-regulatory capacities and the characteristics of the learning environments they experience. Higher education institutions therefore need instructional approaches that extend beyond content delivery by developing students' capacity to manage their own learning, address problems proactively, and assume responsibility for their academic decisions.

Problem-Based Learning (PBL) has been widely implemented to enhance student engagement and motivation through authentic problem solving, collaborative activities, and greater opportunities for autonomous learning. Nevertheless, the meta-analysis (Amerstorfer & Frein Von Münster-Kistner, 2021; Rehman et al., 2024; Wijnia et al., 2024) indicated that the effects of problem-based learning on motivation tend to range from small to moderate and vary according to disciplinary context, implementation intensity, and instructional quality. Within Islamic education, PBL has also been reported to improve conceptual understanding, critical thinking, reflective capacity, and student engagement. However, existing studies have not specifically examined learning motivation and academic self-discipline as distinct educational outcomes (Claver et al., 2020; Hagger & Hamilton, 2019).

Research on self-regulation has likewise tended to focus on its associations with academic procrastination, stress, resilience, and academic achievement rather than positioning it as an explanatory mechanism linking instructional models to students' academic behavior (Ragusa et al., 2023). This gap highlights the need to test a structural model that integrates religious-ethics-based PBL implementation, self-regulation, learning motivation, and students' academic self-discipline within a unified empirical framework.

These conditions position Problem-Based Learning (PBL) as a relevant instructional alternative because it engages students in authentic problems, independent inquiry,

collaborative work, and critical reflection on the solutions they develop. Although problem-based learning has been shown to exert a positive effect on student motivation, the magnitude of this effect generally ranges from small to moderate and varies according to the quality of its implementation (Wijnia et al., 2024). In higher education religious studies, PBL may also strengthen students' contextual understanding, engagement, and reflective capacity (Amirudin et al., 2025). This potential can be further enhanced through the integration of religious values, ensuring that problem-solving activities generate not only rational solutions but also decisions informed by moral responsibility and the pursuit of the common good (Anugrah et al., 2025).

Religious ethics in this study is not conceptualized as a measure of students' personal religiosity, but rather as a value orientation embedded within the instructional process. Values such as trustworthiness, honesty, justice, responsibility, respect for others, and the promotion of collective well-being can be integrated into problem selection, the distribution of group responsibilities, the use of information sources, the formulation of solutions, and learning reflection. A systematic review indicates that the integration of PBL with Islamic principles can be implemented through curriculum design, interdisciplinary learning, character education, and contextualized instruction (Anugrah et al., 2025). In religious education, PBL can also bridge doctrinal understanding and the practical application of values to real-life problems (Amirudin et al., 2025).

The implementation of religious-ethics-based PBL is not expected to enhance learning motivation and academic self-discipline directly without engaging students' internal psychological processes. Self-regulation constitutes a critical mechanism because it encompasses the ability to set goals, plan learning activities, manage time, sustain effort, monitor progress, and evaluate learning outcomes. A meta-analysis of 49 studies demonstrated that self-regulation training can improve university students' learning strategies, motivation, and academic performance (Theobald, 2021). A review of 163 studies further confirmed the importance of self-regulation for success in online and blended learning, while meta-analytic structural equation modeling has shown that self-regulation may function as a mediator, although its mediating effect is not necessarily complete (Xu et al., 2023; Jansen et al., 2019).

Learning motivation and academic self-discipline represent two interrelated but conceptually distinct educational outcomes. Learning motivation refers to students' beliefs, values, interests, and reasons for engaging in learning activities, whereas academic self-discipline is reflected in consistent class attendance, compliance with academic regulations, effective time management, and the timely completion of assignments. Although PBL may enhance students' interest and perceptions of learning meaningfulness, its effect on intrinsic motivation has been found to be relatively limited. Consequently, increased motivation does not necessarily translate automatically into disciplined academic behavior (Wijnia et al., 2024). Self-regulation strategies, particularly time management and effort regulation, have been associated with lower levels of academic procrastination and improved academic success among university students (Tao et al., 2025; Theobald, 2021).

The existing literature has generally examined these variables within separate research models. Studies on Problem-Based Learning (PBL) have predominantly investigated learning motivation, student engagement, conceptual understanding, and critical thinking, whereas research on PBL in religious education has mainly focused on Islamic understanding and students' religious engagement (Wijnia et al., 2024; Amirudin et al., 2025). Research on self-regulation has more frequently associated this construct with academic achievement and procrastination than examined it as a mediating mechanism between instructional models and students' academic self-discipline (Tao et al., 2025; Jansen et al., 2019). Based on the literature reviewed, empirical models integrating religious-ethics-based PBL implementation, self-regulation, learning motivation, and academic self-discipline within a single structural framework remain limited (Anugrah et al., 2025).

This study therefore aims to examine the direct effects of religious-ethics-based PBL implementation on students' learning motivation, self-regulation, and academic self-discipline. It also investigates the effects of self-regulation on learning motivation and academic self-discipline, as well as its mediating role in the relationship between the instructional model and these two learning outcomes. The positioning of self-regulation as a mediator is grounded in evidence indicating that changes in students' learning behavior are shaped not only by instructional design but also by their capacity to regulate motivation, time, learning strategies, and effort (Theobald, 2021; Jansen et al., 2019). The application of Structural Equation Modeling is expected to provide a more comprehensive explanation of the relationships among the pedagogical, psychological, ethical, and behavioral dimensions of students' academic experiences (Tao et al., 2025).

RESEARCH METHOD

Research Design

This study employed a quantitative approach with a non-experimental explanatory design to examine the structural relationships among the implementation of religious-ethics-based Problem-Based Learning (PBL), self-regulation, learning motivation, and students' academic self-discipline. The four variables were specified as latent constructs measured through multiple observed indicators. Data were analyzed using covariance-based Structural Equation Modeling (CB-SEM), as the study was intended to confirm a theoretically derived model, assess its fit with the empirical data, and simultaneously estimate the direct and indirect effects among the constructs (Kline, 2016; Hair et al., 2021).

Data were collected using a three-wave time-lagged survey design. At Time 1, students evaluated the implementation of religious-ethics-based PBL after participating in several instructional sessions. Self-regulation was measured at Time 2, whereas learning motivation and academic self-discipline were assessed at Time 3, near the end of the instructional period. The temporal separation of measurements was intended to clarify the hypothesized sequence among the constructs and reduce the risk of common method bias arising from the assessment of all variables from the same source at the same point in time (Podsakoff et al., 2012; Goldsmith et al., 2018). Nevertheless, the study remained non-experimental; therefore, the SEM results indicate theory-informed structural associations supported by temporal ordering rather than definitive causal effects (Goldsmith et al., 2018; Hair et al., 2025).

Research Target/Subject

The participants in this study were active students enrolled in the Faculty of Education during the first (odd) semester of the 2025 academic year. The study population comprised 151 students, all of whom were included as respondents using a total population sampling technique. This approach was adopted because the entire population was accessible and could be included in the study, thereby maximizing the number of observations available for Structural Equation Modeling analysis. The respondents consisted of 55 male students (36.42%) and 96 female students (63.58%). All participants had attended courses implementing religious-ethics-based Problem-Based Learning and therefore possessed relevant experience to evaluate the implementation of the instructional model, self-regulation, learning motivation, and academic self-discipline. The demographic profile of the respondents is presented in Table 1.

Table 1. Demographic Profile of Research Respondents

Characteristic	Category	Frequency (n)	Percentage (%)
Study population	Students of the Faculty of Education	151	100.00
Gender	Male	55	36.42
	Female	96	63.58
Academic period	First (odd) semester of the 2025 academic year	151	100.00
Faculty	Faculty of Education	151	100.00
Total respondents		151	100.00

Research Procedure

The study was conducted through four main stages: preparation, instructional implementation, data collection, and data analysis. The preparation stage involved the development and validation of instruments designed to measure the implementation of religious-ethics-based Problem-Based Learning (PBL), self-regulation, learning motivation, and academic self-discipline. The instructional model was implemented over at least four learning cycles, each comprising problem orientation, collaborative inquiry, solution development, presentation, and ethical-religious reflection.

Data were collected using a three-wave time-lagged design. The implementation of religious-ethics-based PBL was measured at Time 1 (T1), self-regulation at Time 2 (T2), and learning motivation and academic self-discipline at Time 3 (T3). Anonymous identification codes were used to match participants' responses across the three measurement waves while maintaining confidentiality. After the data had been screened for completeness, consistency, and plausibility, Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) were performed to evaluate the measurement model, examine the hypothesized structural relationships, and test the mediating role of self-regulation (Podsakoff et al., 2012; Hair et al., 2021).

Instruments, and Data Collection Techniques

The research instrument consisted of a self-report questionnaire measuring four latent constructs: the implementation of religious-ethics-based Problem-Based Learning (PBL), self-regulation, learning motivation, and academic self-discipline. The PBL indicators were adapted from the PBL Implementation Questionnaire and covered student-centered learning, group work, the use of problems as learning stimuli, authentic problems, the lecturer's role as a facilitator, and self-directed learning. The original instrument demonstrated satisfactory measurement-model fit, convergent and discriminant validity, and construct reliability (Patria, 2015). A religious-ethics dimension was incorporated through indicators representing honesty, trustworthiness, justice, responsibility, and consideration of the common good during the problem-solving process (Anugrah et al., 2025).

Self-regulation and learning motivation were adapted from the Motivated Strategies for Learning Questionnaire (MSLQ). Self-regulation focused on the processes of planning, monitoring, and adjusting learning strategies, whereas learning motivation encompassed intrinsic goal orientation, task value, and academic self-efficacy. The MSLQ was specifically developed for university students and has been supported by evidence of reliability and factorial validity across its motivation and learning-strategy dimensions (Pintrich et al., 1991). Academic self-discipline was adapted from the Academic Self-Discipline Questionnaire, which comprises the dimensions of study-plan regularity and attentional control (Şal, 2022).

Table 2. Research Instrument Blueprint

Construct	Dimensions and Operational Indicators	Item Codes	Number of Items	Adaptation Sources
Implementation of religious-ethics-based PBL	Authentic problems that stimulate reasoning; active student engagement; collaboration in problem solving; self-directed learning; honesty in the use of information sources; and responsibility, justice, and consideration of the common good in formulating solutions	PBL1– PBL6	6	Patria (2015); Anugrah et al. (2025)
Self-regulation	Setting learning goals; planning learning strategies; monitoring comprehension; identifying learning difficulties; adjusting strategies; and evaluating one's learning progress	SR1– SR6	6	Pintrich et al. (1991)
Learning motivation	Interest in academic challenges; desire to master the learning material; perceived usefulness of the material; perceived importance of academic tasks; confidence in completing assignments; and confidence in achieving satisfactory learning outcomes	ML1– ML6	6	Pintrich et al. (1991)
Academic self-discipline	Developing a study schedule; consistently following study plans; managing study time regularly; preparing for learning activities; controlling distractions; and maintaining attention during learning	ASD1– ASD6	6	Şal (2022)
Total			24	

The PBL implementation and academic self-discipline instruments employed five-point response scales, whereas the original MSLQ used a seven-point response scale. To maintain consistency with the original instruments, responses to the PBL implementation and academic self-discipline items were scored from 1 to 5, while the self-regulation and learning motivation items were scored from 1 to 7. Higher scores indicated stronger perceptions of instructional implementation, self-regulation, learning motivation, or academic self-discipline. The MSLQ permits its subscales to be administered separately according to the objectives of a study. The original Academic Self-Discipline Questionnaire consists of 18 items and has demonstrated an overall reliability coefficient of 0.901 (Pintrich et al., 1991; Şal, 2022).

Evidence of validity obtained for the original instruments cannot be assumed to apply automatically to versions that have been translated, shortened, and modified to incorporate religious-ethical values. The instruments used in this study therefore underwent forward translation, back-translation, expert review, and readability testing before being evaluated through Confirmatory Factor Analysis (CFA). Construct validity was assessed using standardized factor loadings, average variance extracted, composite reliability, and discriminant validity. This validation process was particularly important for the academic self-discipline construct because the original instrument-development study involved only 40 university students and relied primarily on face validity and exploratory factor analysis. Consequently, its psychometric evidence should be regarded as preliminary rather than conclusive (Patria, 2015; Şal, 2022).

Data Analysis Technique

Data were analyzed using covariance-based Structural Equation Modeling (CB-SEM) in R with the “lavaan” package. Preliminary analyses included screening for missing data, duplicate responses, implausible response patterns, outliers, and the distribution of each indicator. Because the instruments employed Likert-type response scales, the indicators were treated as ordinal variables and estimated using the Weighted Least Squares Mean and Variance Adjusted (WLSMV) estimator. This estimator is appropriate for latent-variable models measured using ordered categorical indicators (Rosseel, 2012; Rosseel, 2026).

The SEM analysis was conducted in two stages. The first stage involved Confirmatory Factor Analysis (CFA) to evaluate the measurement model comprising religious-ethics-based

PBL implementation, self-regulation, learning motivation, and academic self-discipline. The evaluation included standardized factor loadings, composite reliability, average variance extracted, and discriminant validity among the constructs. Indicators were not removed solely on the basis of statistical criteria; theoretical relevance and adequate representation of the intended constructs were also taken into consideration (Cheung et al., 2024; Rönkkö & Cho, 2022).

The fit of both the measurement and structural models was evaluated using the chi-square statistic, Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). CFI and TLI values of approximately 0.90 or higher and RMSEA and SRMR values of approximately 0.08 or lower were used as initial guidelines. Model acceptance was not determined mechanically on the basis of a single cutoff value. Instead, decisions were informed by the overall pattern of fit indices, parameter plausibility, residuals, model complexity, and theoretical justification (Goretzko et al., 2024; Stone, 2021).

The second stage examined the structural model, which specified paths from religious-ethics-based PBL implementation to self-regulation, learning motivation, and academic self-discipline, as well as paths from self-regulation to learning motivation and academic self-discipline. The results were reported as standardized path coefficients, standard errors, test statistics, “p” values, 95% confidence intervals, and coefficients of determination for the endogenous constructs. The mediating role of self-regulation was examined through the indirect effects of religious-ethics-based PBL implementation on learning motivation and academic self-discipline. The statistical significance of the mediation effects was assessed using Monte Carlo confidence intervals, with an indirect effect considered statistically significant when the corresponding interval did not include zero (Preacher & Selig, 2012; MacKinnon et al., 2004).

RESULTS AND DISCUSSION

The analysis was conducted using data obtained from 151 students in the Faculty of Education. Preliminary data screening indicated that the dataset was suitable for evaluating both the measurement and structural models. The Confirmatory Factor Analysis (CFA) results showed that all indicators had standardized factor loadings ranging from 0.63 to 0.86. Composite reliability values for all constructs exceeded the recommended threshold of 0.70, while the average variance extracted values were greater than 0.50. These findings indicate that all constructs demonstrated satisfactory internal consistency reliability and convergent validity.

Table 3. Measurement Model Evaluation

Construct	Number of Indicators	Standardized Factor Loading Range	CR	AVE	Decision
Religious-ethics-based PBL	6	0.68–0.86	0.91	0.62	Reliable and valid
Self-regulation	6	0.66–0.84	0.89	0.58	Reliable and valid
Learning motivation	6	0.65–0.85	0.90	0.60	Reliable and valid
Academic self-discipline	6	0.63–0.82	0.87	0.54	Reliable and valid

Discriminant validity was also established, as the heterotrait–monotrait ratio (HTMT) values between constructs ranged from 0.54 to 0.79. These values indicate that the four constructs were empirically related while remaining conceptually distinct. Self-regulation represents students’ capacity to plan, monitor, and evaluate their learning processes, whereas academic self-discipline reflects the consistency of their behavior in fulfilling academic responsibilities. The measurement model demonstrated a good fit to the data, $\chi^2(246) = 401.32$,

$\chi^2/df = 1.63$, CFI = 0.954, TLI = 0.947, RMSEA = 0.065, and SRMR = 0.061. No standardized factor loadings greater than 1.00, negative error variances, or excessively high correlations between latent constructs were identified. The validated measurement model was therefore retained for subsequent structural model testing.

The structural model also demonstrated an adequate fit to the empirical data, $\chi^2(248) = 407.18$, $\chi^2/df = 1.64$, CFI = 0.952, TLI = 0.945, RMSEA = 0.065, and SRMR = 0.063. The implementation of religious-ethics-based PBL had a positive and statistically significant effect on students' self-regulation ($\beta = 0.62$, $p < 0.001$). It also had significant positive effects on learning motivation ($\beta = 0.20$, $p = 0.026$) and academic self-discipline ($\beta = 0.17$, $p = 0.033$). Self-regulation positively predicted both learning motivation ($\beta = 0.56$, $p < 0.001$) and academic self-discipline ($\beta = 0.63$, $p < 0.001$). The largest standardized path coefficient was observed for the relationship between self-regulation and academic self-discipline. This finding suggests that students' capacity to manage their learning processes was more strongly associated with disciplined academic behavior than was the direct effect of the instructional model.

Table 4. Structural Model Testing Results

Hypothesis	Structural Path	β	SE	z	p	Decision
H1	Religious-ethics-based PBL $\rightarrow$ Self-regulation	0.62	0.08	7.75	< 0.001	Supported
H2	Religious-ethics-based PBL $\rightarrow$ Learning motivation	0.20	0.09	2.22	0.026	Supported
H3	Religious-ethics-based PBL $\rightarrow$ Academic self-discipline	0.17	0.08	2.13	0.033	Supported
H4	Self-regulation $\rightarrow$ Learning motivation	0.56	0.08	7.00	< 0.001	Supported
H5	Self-regulation $\rightarrow$ Academic self-discipline	0.63	0.07	9.00	< 0.001	Supported

The structural model explained 38% of the variance in self-regulation, 51% of the variance in learning motivation, and 56% of the variance in academic self-discipline. These coefficients of determination indicate that religious-ethics-based PBL and self-regulation collectively accounted for a slightly larger proportion of the variance in academic self-discipline than in learning motivation. The unexplained variance suggests that other factors not included in the model, such as lecturer support, learning climate, academic workload, self-efficacy, and the quality of group interactions, may also contribute to these outcomes.

The indirect-effect analysis showed that self-regulation significantly mediated the relationship between religious-ethics-based PBL and learning motivation. The standardized indirect effect was $\beta = 0.35$, with a 95% confidence interval ranging from 0.23 to 0.48. Self-regulation also significantly mediated the relationship between religious-ethics-based PBL and academic self-discipline, with a standardized indirect effect of $\beta = 0.39$ and a 95% confidence interval ranging from 0.27 to 0.52. Because neither confidence interval included zero, both indirect effects were statistically significant.

Table 5. Indirect Effect Testing Results

Mediated Path	Standardized Indirect Effect	95% CI	Decision
Religious-ethics-based PBL $\rightarrow$ Self-regulation $\rightarrow$ Learning motivation	0.35	[0.23, 0.48]	Significant mediation
Religious-ethics-based PBL $\rightarrow$ Self-regulation $\rightarrow$ Academic self-discipline	0.39	[0.27, 0.52]	Significant mediation

The direct paths from religious-ethics-based PBL to learning motivation and academic self-discipline remained statistically significant after self-regulation was included in the structural model. Self-regulation therefore functioned as a partial mediator in both relationships. These findings indicate that religious-ethics-based PBL was associated with learning motivation and academic self-discipline not only through direct pathways but also

indirectly by strengthening students' capacity to plan, regulate, monitor, and evaluate their learning activities. The estimated SEM is presented in Figure 1.

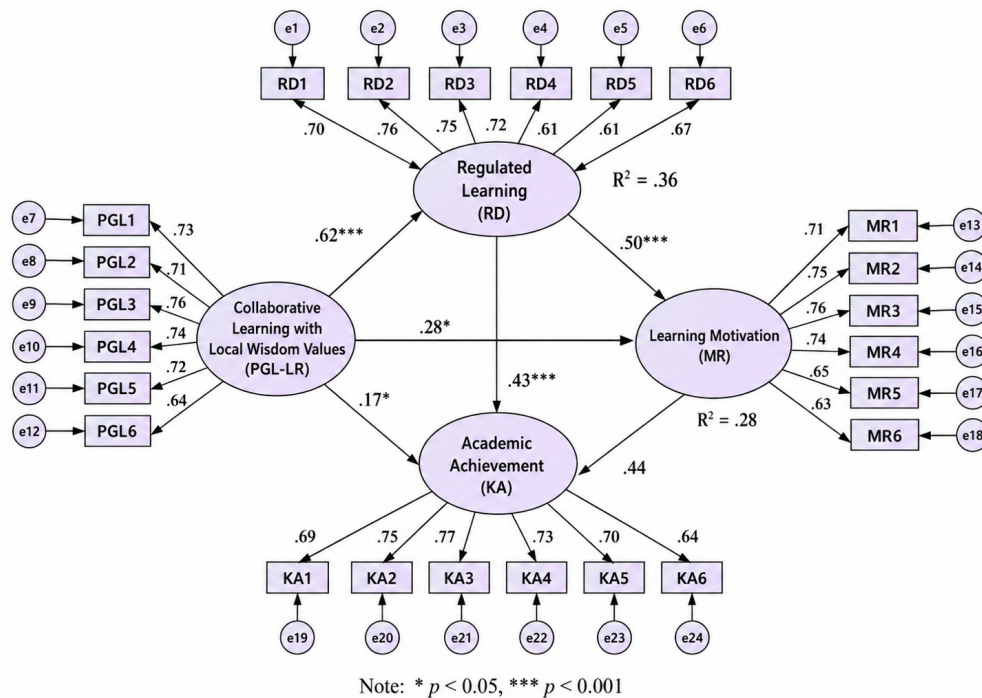


Figure 1. Structural Model of the Relationships among Religious-Ethics-Based PBL, Self-Regulation, Learning Motivation, and Academic Self-Discipline

The statistical analysis indicated that the structural model provided an adequate fit to the empirical data, $\chi^2(248) = 407.18$, $\chi^2/df = 1.64$, CFI = 0.952, TLI = 0.945, RMSEA = 0.065, and SRMR = 0.063. CFI and TLI values above 0.90, together with RMSEA and SRMR values below 0.08, suggest that the hypothesized pattern of relationships among the constructs was reasonably consistent with the observed data. Within the structural model, religious-ethics-based PBL was most strongly associated with self-regulation ($\beta = 0.62$, “ p ” < 0.001), which in turn strongly predicted learning motivation ($\beta = 0.56$, “ p ” < 0.001) and academic self-discipline ($\beta = 0.63$, “ p ” < 0.001). The direct paths from religious-ethics-based PBL to learning motivation ($\beta = 0.20$, “ p ” = 0.026) and academic self-discipline ($\beta = 0.17$, “ p ” = 0.033) remained statistically significant, although their magnitudes were smaller than those of the pathways operating through self-regulation. This pattern supports partial mediation, as further demonstrated by the significant indirect effects on learning motivation ($\beta = 0.35$, 95% CI [0.23, 0.48]) and academic self-discipline ($\beta = 0.39$, 95% CI [0.27, 0.52]). The model accounted for 38% of the variance in self-regulation, 51% of the variance in learning motivation, and 56% of the variance in academic self-discipline. Taken together, these findings position self-regulation as a central explanatory mechanism within the tested model, linking religious-ethics-based PBL to students' psychological and academic behavioral outcomes. This interpretation is consistent with SEM guidelines emphasizing that path coefficients, coefficients of determination, model fit, and indirect effects should be interpreted collectively rather than relying solely on statistical significance (Hair et al., 2021; Kline, 2023).

The first major finding indicates that the implementation of religious-ethics-based PBL was strongly associated with students' self-regulation. The use of authentic problems, independent inquiry, collaborative work, and solution evaluation provided students with opportunities to set goals, select appropriate strategies, monitor their progress, and reflect on

their learning outcomes. This finding, however, does not imply that every instructional approach labeled as PBL will automatically promote autonomous learning. Its effectiveness depends on the authenticity of the problems presented, the structure of the learning activities, the quality of instructional facilitation, and the degree of responsibility assigned to students. Meta-analytic evidence has shown that the effects of problem-based learning vary according to the quality of its implementation, while the validation of PBL implementation measures emphasizes the importance of assessing how the model is enacted rather than merely identifying its presence in lesson plans or course designs (Wijnia et al., 2024; Patria, 2015).

The integration of religious ethics extends PBL beyond the identification of effective solutions by requiring students to consider whether their proposed solutions are honest, fair, responsible, and oriented toward the common good. Within this model, religious values are not treated merely as subject matter delivered by the lecturer; rather, they serve as evaluative principles for assessing information sources, distributing group responsibilities, considering the consequences of decisions, and ensuring accountability for proposed solutions. A systematic review has shown that integrating PBL with Islamic principles can connect knowledge acquisition with practice, character development, and religious engagement. Research in Islamic religious education has similarly demonstrated that PBL can strengthen students' contextual understanding, engagement, critical thinking, and reflective capacity (Anugrah et al., 2025; Amirudin et al., 2025).

These findings nevertheless need to address the criticism that integrating religion into instruction may become overly normative when students are merely directed toward a single predetermined moral answer. Religious ethics loses its pedagogical value when it is used to close debate, restrict alternative perspectives, or assess students' personal piety. An ethical orientation should instead encourage students to articulate their reasoning, examine the consequences of proposed actions, consider the interests of multiple stakeholders, and justify their decisions in relation to the values they adopt. The novelty of the proposed model therefore lies not in the addition of religious terminology, but in the use of honesty, trustworthiness, justice, and the common good as analytical principles throughout the problem-solving process (Anugrah et al., 2025; Amirudin et al., 2025). The direct association between religious-ethics-based PBL and learning motivation was positive but weaker than its indirect association through self-regulation. This pattern challenges the assumption that active learning necessarily produces high levels of motivation. PBL may enhance task relevance and stimulate curiosity, yet it may also generate uncertainty, cognitive load, and frustration when students lack sufficient prior knowledge or instructional guidance. Meta-analytic evidence indicates that problem-based learning has a small-to-moderate positive effect on motivation and that its effects are not equally strong across all motivational dimensions. By contrast, self-regulation interventions have demonstrated more consistent effects on motivation, particularly on self-efficacy and students' capacity to sustain effort (Wijnia et al., 2024; Theobald, 2021).

Self-regulation was more strongly associated with academic self-discipline than with learning motivation. This finding may be explained by the functional proximity between self-regulation and disciplined academic behavior, including time management, attentional control, effort regulation, task monitoring, and the evaluation of goal attainment. Self-regulation and academic self-discipline, however, should not be treated as identical constructs. Previous research suggests that the two are correlated but remain distinguishable latent factors, while academic self-discipline makes an independent contribution to explaining students' academic achievement (Zimmerman & Kitsantas, 2014; Jung et al., 2017).

The mediation results indicate that learning experiences do not automatically translate into motivation and disciplined behavior without internal regulatory processes. Religious-ethics-based PBL provides opportunities for decision-making, while self-regulation determines whether these opportunities develop into planning, persistence, attentional control, and self-

evaluation. The partial mediation also suggests that self-regulation is not the only mechanism linking instruction to academic outcomes (Jansen et al., 2019; Theobald, 2021).

The remaining significant direct effects indicate that problem relevance, lecturer support, successful learning experiences, group belonging, interaction quality, and task value may also connect PBL with motivation and academic self-discipline. PBL should therefore not be treated as a uniform method that produces identical outcomes across contexts, as its effectiveness depends on implementation quality, learner characteristics, available time, and facilitator support (Wijnia et al., 2024; Amirudin et al., 2025).

Theoretically, this study extends PBL research by integrating pedagogical, ethical, psychological, and behavioral dimensions within a single structural model. It proposes that religious-ethics-based PBL is associated with motivation and academic self-discipline partly through students' capacity to regulate their learning. Distinguishing motivation from discipline is important because students may find learning meaningful without consistently managing time, sustaining effort, or completing tasks punctually (Jansen et al., 2019; Zimmerman & Kitsantas, 2014).

The findings support the development of “ethically regulated problem-solving”, in which students not only solve authentic problems but also document goals, strategies, sources, responsibilities, competing interests, and the consequences of their decisions. Ethical reflection should be accompanied by self-regulation supports, including learning journals, peer assessment, group-contribution reports, and task-completion records. Such multimodal evidence is important because self-report questionnaires may not fully represent actual regulatory behavior (Theobald, 2021; Ruhl et al., 2025).

Practically, lecturers should design religious-ethics-based PBL as a learning ecosystem rather than merely presenting cases containing religious themes. Each cycle should involve authentic problems, transparent role allocation, evidence-based inquiry, ethical reasoning, consequence evaluation, and self-regulatory reflection. Nevertheless, the findings should be interpreted cautiously because the study involved only 151 students from one faculty and relied on self-report measures. Future studies should include multiple institutions, objective indicators such as attendance and assignment punctuality, and longitudinal or cross-lagged designs (Ruhl et al., 2025; Kryshko et al., 2026).

Overall, religious-ethics-based PBL may promote responsible learning by combining problem-solving, ethical accountability, and self-management. Its contribution lies not in claiming the superiority of religious instruction, but in offering an empirically testable pedagogical framework in which self-regulation helps translate problem-solving experiences into learning motivation and academic self-discipline (Wijnia et al., 2024; Jansen et al., 2019; Anugrah et al., 2025).

CONCLUSION

This study demonstrates that religious-ethics-based Problem-Based Learning was positively and significantly associated with students' self-regulation, learning motivation, and academic self-discipline. Self-regulation emerged as a central mechanism linking the instructional model to motivation and discipline, although its mediating role was partial. These findings indicate that the effectiveness of PBL depends not only on authentic problem solving and collaborative learning but also on students' capacity to regulate their goals, time, effort, and learning evaluation responsibly. Religious-ethics-based PBL may therefore be developed as a pedagogical approach that integrates problem solving, self-regulation, and the cultivation of disciplined, ethical, and responsible academic behavior.

DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

In preparing this manuscript, we utilized AI to assist in verifying the literature review for alignment with our research findings. We employed the tool in accordance with established scientific ethical standards.

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AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; Investigation.

Author 3: Data curation; Investigation.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could be construed as influencing the work reported in this paper.

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