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SELF-REGULATION AS A PREDICTOR OF STUDENT ACADEMIC ACHIEVEMENT IN ISLAMIC HIGHER EDUCATION

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Abstract: The combination of religious science and science in the Islamic higher education curriculum requires students to manage the learning process autonomously as an essential prerequisite for academic success. This research intends to empirically examine the role of self-regulation capacity as a predictor of academic achievement of STAI Darul Hikmah Bangkalan students, Madura, Indonesia. Applying a quantitative approach with a correlational design, the study involved 180 students who were selected through proportionate stratified random sampling. Data were obtained using a self-regulation scale based on the theory of self-regulated learning which has been validated via expert judgment and Exploratory Factor Analysis (KMO = 0.84; factor loading 0.53–0.81; cumulative variance of 58.7%), as well as official documentation of GPA. The analysis was carried out with simple linear regression. The findings indicate that self-regulation significantly predicts academic achievement (B = 0.014; t = 6.875; p < 0.000). The determination coefficient (R^2 = 0.210) shows that self-regulation explains 21% of the variance in academic achievement a magnitude of the moderate-to-large effect according to Cohen's conventional guidelines. These findings confirm that the academic success of STAI Darul Hikmah students which carries out a dual curriculum and is rooted in the tradition of Islamic boarding schools is not solely supported by intellectual capacity, but is firmly predicted by the effectiveness of self-regulated learning (SRL) strategies enriched by Islamic values. As an implication, the strengthening of SRL-based academic guidance that consciously embeds the spiritual dimension is a necessity in order to produce independent, resilient, and competitive graduates.

Keywords: Self-Regulation, Academic Achievement, Self-Regulated Learning, SRL, GPA.

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INTRODUCTION

Academic achievement is a fundamental indicator of student success in fulfilling learning outcomes at the higher education level.[1] At the high school level, this achievement is represented through the Cumulative Achievement Index (GPA) which not only reflects the mastery of cognitive competence, but also functions as elementary capital to enter the professional world.

[1] Ricarda Steinmayr et al., *Academic Achievement* (Oxford University Press Oxford, UK, 2014).

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GPA has been shown to be a strong predictor of academic and professional success, while self-regulated learning strategies contribute significantly to GPA achievement in various higher education contexts.[2] Nevertheless, generalizing these findings into the context of Islamic universities in Indonesia requires the availability of adequate local evidence.

In Indonesia, a number of studies show that GPA plays a significant role in shaping graduate job opportunities. Multinational companies and large national companies in Indonesia usually set a minimum GPA requirement of 2.75–3.00, and not a few require a minimum GPA of 3.25, so that the minimum GPA limit set by the industrial world has a direct impact on graduate employment opportunities.[3] Furthermore, female graduates with a GPA of 3.0–3.5 were 87% more likely to get a job in less than six months post-graduation (representing 21% of the data), male graduates and contract employees with the same GPA range were 76% likely to be 76% more likely (representing 15% of the data), while graduates with a GPA above 3.5 were 75% likely to obtain a job in less than six months and work in a field aligned with their major (representing 19% of the data).[4] This local evidence emphasizes the relevance of GPA as a predictor of career success in the Indonesian context.

Academic achievement is not solely influenced by intellectual capacity, but is also significantly predicted by noncognitive factors. In a sample of Spanish students, academic engagement and self-efficacy were shown to explain up to 50% variation in academic grades when combined with previous achievement data.[5] Although these findings come from a Western educational context that is culturally different from Indonesia, the consistency of the direction of influence of these noncognitive factors provides a solid foothold to explore its role in the context of Islamic universities. It is within this framework that self-regulated learning (SRL) emerges as a crucial predictor that contributes to the achievement of student academic achievement.

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[2] Michelle Richardson et al., 'Psychological Correlates of University Students' Academic Performance: A Systematic Review and Meta-Analysis.', *Psychological Bulletin* 138, no. 2 (2012): 353–87, https://doi.org/10.1037/a0026838; Maria Theobald, 'Self-Regulated Learning Training Programs Enhance University Students' Academic Performance, Self-Regulated Learning Strategies, and Motivation: A Meta-Analysis', *Contemporary Educational Psychology* 66 (July 2021): 101976, https://doi.org/10.1016/j.cedpsych.2021.101976.

[3] Aditya Andika et al., 'Factors Affecting Indonesian Higher Education Institution Students' Academic Achievement in the Industry 4.0 Era', *ELS Journal on Interdisciplinary Studies in Humanities* 4, no. 3 (2021): 270–82, https://doi.org/10.34050/elsjish.v4i3.15003.

[4] Surya Andika et al., 'Penerapan Data Mining Pada Hasil Tracer Study Alumni Untuk Menemukan Pola Asosiasi Dengan Algoritma Fp-Growth', *Jurnal Nasional Komputasi Dan Teknologi Informasi (JNKTI)* 5, no. 3 (2022): 464–73, https://doi.org/10.32672/jnkti.v5i3.4407.

[5] Juan-Carlos Pérez-González et al., 'Integrating Self-Regulated Learning and Individual Differences in the Prediction of University Academic Achievement across a Three-Year-Long Degree', *Metacognition and Learning* 17, no. 3 (2022): 1141–65, https://doi.org/10.1007/s11409-022-09315-w.

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Conceptually, SRL is defined as an active process in which learners autonomously set goals, strategize, and monitor and reflect on their learning process.[6] SRL is a multidimensional construct that involves various integrative models in explaining academic success.[7] This process operates through a cycle of three main phases: the planning phase (forethought), the implementation phase (performance), and the self-reflection phase.[8] In line with this perspective, SRL is conceptualized as a constructive process that integrates the regulation of cognition, motivation, and behavior.[9] SRL strategies such as self-evaluation, metacognitive regulation, and business management have been shown to be positive predictors of academic success, especially in online learning environments.[10] Furthermore, the utilization of metacognitive skills in SRL has been shown to help students develop the cognitive and emotional resilience necessary to achieve academic success.[11]

Although the SRL model put forward by Zimmerman has been extensively tested in various educational contexts, this framework was developed in Western educational traditions that emphasize individual autonomy and secular orientation. To date, there have been no studies that empirically validate Zimmerman's three-phase model in the context of Islamic universities in Madura that integrate religious and science curricula. This condition raises critical questions about the transferability of the model into the context of a religiously integrated curriculum. In this kind of environment, the learning process is not solely directed at academic achievement, but is also strongly colored by spiritual values such as istiqamah (perseverance), submission to Allah, and exemplary-based learning. These values have the potential to form a distinctive self-regulation mechanism in students, for example by making worship part of a forethought strategy, or relying the self-reflection process on blessing parameters other than cognitive achievement.

The implementation of an effective SRL strategy significantly increases student cognitive engagement. Self-regulation skills, especially in the dimensions of reflection and time management,

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[6] Barry J. Zimmerman, 'Becoming a Self-Regulated Learner: An Overview', *Theory Into Practice* 41, no. 2 (2002): 64–70, https://doi.org/10.1207/s15430421tip4102_2.

[7] Ernesto Panadero, 'A Review of Self-Regulated Learning: Six Models and Four Directions for Research', *Frontiers in Psychology* 8 (April 2017): 422, https://doi.org/10.3389/fpsyg.2017.00422.

[8] Zimmerman, 'Becoming a Self-Regulated Learner'.

[9] Paul R. Pintrich, 'The Role of Goal Orientation in Self-Regulated Learning', in *Handbook of Self-Regulation* (Elsevier, 2000), https://doi.org/10.1016/B978-012109890-2/50043-3.

[10] Ling Xu et al., 'The Impact of Self-Regulated Learning Strategies on Academic Performance for Online Learning During COVID-19', *Frontiers in Psychology* 13 (November 2022): 1047680, https://doi.org/10.3389/fpsyg.2022.1047680.

[11] Abba, Hafiz and Gurjiya, S. A., 'Quality Education amidst Insecurity: Interplay of Metacognition and Self-Regulation on Academic Achievement among Senior Secondary School Students in Kaura-Namoda, Zamfara State', *Federal University Gusau Faculty of Education Journal* 5, no. 2 (2025): 29–34, https://doi.org/10.64348/zije.20256; S. Abdul Jabbar, 'The Interplay of Self-Regulation and Achievement in Education', preprint, Arts and Humanities, 15 September 2025, https://doi.org/10.20944/preprints202509.1155.v1.

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have a strong positive correlation with academic achievement.[12] In health professional education, students who apply the SRL strategy are able to achieve academic and personal goals through individually designed learning strategies.[13] Furthermore, the integration of SRL with intrinsic motivation is able to reduce maladaptive behavior, while its interaction with academic flow strengthens the role of internal factors in achieving optimal learning outcomes.[14] Studies on students in various educational contexts, including language education students in Morocco, show that SRL constructs are a significant predictor of learning outcomes, although the magnitude of the effect varies depending on the characteristics of the sample and the instruments used.[15] However, the influence of SRL is sometimes complex; The relationship between SRL and academic achievement is often mediated by students' perceptions of the blended learning environment.[16]

Recent empirical support further strengthens the thesis that SRL dimensions such as goal setting, planning, and adaptability are key foundations of academic success.[17] External factors such as family environmental support and emotional resilience also reinforce the effectiveness of self-regulation in improving learning outcomes.[18] Furthermore, students with high SRL competencies tend to achieve superior academic results in an offline learning environment, which is due to a clearer learning structure and accountability between students that encourages more optimal learning engagement compared to online learning.[19]

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[12] Alexander F. Suan, 'Self–Regulation as an Antecedent of Academic Achievement: A Mixed Method Study', *British Journal of Multidisciplinary and Advanced Studies* 4, no. 4 (2023): 20–43, https://doi.org/10.37745/bjmas.2022.0246.

[13] Ebenezer Chitra et al., 'Self-Regulated Learning Practice of Undergraduate Students in Health Professions Programs', *Frontiers in Medicine* 9 (February 2022): 803069, https://doi.org/10.3389/fmed.2022.803069.

[14] Wahda Fatwalino, *Pengaruh Antara Self-Regulated Learning Dan Flow Akademik Terhadap Prestasi Akademik Mahasiswa Fakultas Teknik Universitas Muhammadiyah Gresik*, 2024, https://doi.org/http://eprints.umg.ac.id/12236/; Dewi Puspita Ningsih and Erna Anggraini, 'Integrasi Self-Regulated Learning Dan Motivasi Intrinsik: Fondasi Prestasi Akademik Mahasiswa', *MANDALA WIDYA: Jurnal Ilmu Pendidikan* 1, no. 1 (2025): 26–36, https://doi.org/10.71094/mandalawidya.v1i1.4.

[15] Omar Baissane and Hassan Zaid, 'Bridging the Gap: Exploring Self-Regulated Learning and Academic Achievement in Moroccan Higher Education', *Journal of Interdisciplinary Studies in Education* 14, no. 4 (2025): 139–52, https://doi.org/10.32674/kmf9bx98.

[16] Hoang Anh Thu Dang et al., 'Khám Phá Mối Liên Hệ Giữa Học Tập Tự Điều Chỉnh Và Tự Đánh Giá Kết Quả Học Tập Trong Môi Trường Học Tập Kết Hợp - Exploring the Relationship Between Self-Regulated Learning and Students' Self-Evaluation Academic Achievement Towards Blended Learning Environment.', *Journal of Education and Society*, 30 June 2025, 154, https://doi.org/10.64410/ZDKQ4275.

[17] Liu Caixia et al., 'Self-Regulated Learning and Academic Achievement in Higher Education: A Decade Systematic Review', *International Journal of Research and Innovation in Social Science* IX, no. III (2025): 4488–504, https://doi.org/10.47772/IJRISS.2025.90300358; Zidhna Waheed et al., 'The Impact of Self-Regulated Learning Strategies on Academic Performance: A Systematic Review', *Social Science and Human Research Bulletin* 02, no. 08 (2025), https://doi.org/10.55677/SSHRB/2025-3050-0803.

[18] Sukhminder Kaur and Harjot Kaur, 'Self-Regulation, Family Climate, And Gender: A Study of Rural Adolescent Development', *International Journal of Indian Psychology* 13, no. 2 (2025): 4448–61, https://doi.org/https://doi.org/10.25215/1302.395.

[19] Ashish Kumar and Dr. Mansi Kapoor, 'Impact of Self-Regulated Learning on Academic Performance in Online and Offline Learning Environment', *International Journal of Interdisciplinary Approaches in Psychology* 3, no. 7 (2025), https://doi.org/10.61113/ijiap.v3i7.1085.

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Although the discourse on SRL has developed rapidly, empirical studies in the specific context of Islamic universities in Madura are still very limited, with three main gaps remaining unaddressed. First, there is no study that specifically examines SRL at STAI Darul Hikmah Bangkalan, an institution that represents the context of local Islamic education in Madura. Second, there have been no studies that test the role of SRL in the context of a dual curriculum that integrates religious sciences (such as tafsir, hadith, and fiqh) with general sciences (such as economics, management, and educational psychology)—a characteristic that distinguishes STAI from public universities and traditional Islamic boarding schools. Students at this institution also face a pedagogical transition from a kiai-centered pesantren learning pattern to autonomous learning, as well as social pressure from families and communities to not only excel academically, but also become moral and spiritual role models. Third, there are no studies available using the SRL scale based on the three-phase Zimmerman model that have been empirically validated in the student population in the local Islamic education environment. These three gaps underscore the urgency of research that specifically examines the role of SRL in this distinctive context.

Starting from these three gaps, this research aims to fill these gaps by empirically testing the role of self-regulation capacity as a predictor of student academic achievement at STAI Darul Hikmah Bangkalan, using the SRL scale based on the Zimmerman three-phase model that has been validated in the local population. The findings of this research are expected to contribute to the theoretical contribution to the development of SRL-based learning strategies that are relevant to the characteristics of students in local Islamic universities, as well as a foothold for institutional policies in improving the quality of graduates with competitiveness and integrity.

METHODS

1. Population and Sample

This research adopts a quantitative approach with a correlational design to test the influence of self-regulation capacity on student academic achievement. The research population includes all active students at STAI Darul Hikmah Bangkalan in the 2025/2026 academic year. The sampling technique was taken through proportionate stratified random sampling based on the study program strata (2 study programs: Islamic Religious Education and Sharia Economics) and the semester level (semesters 3, 5, and 7), so that 6 strata were obtained. The sample size was determined using the Slovin formula with a margin of error of 5%, resulting in 180 respondents who met the inclusion criteria: active students for at least 3 semesters and have complete GPA data. Details of the distribution of samples per stratum are presented in the supplementary material (Table S2).

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2. Data Collection

Primary data collection is carried out through the distribution of structured questionnaires online and offline, while secondary data is collected from the institution's official Cumulative Achievement Index (GPA) documentation. The entire data collection process has obtained ethical approval from the campus and informed consent from each respondent.

3. Research Instruments

The research instrument is composed of two main parts. First, the self-regulation scale adapted from the self-regulated learning (SRL) indicator.[20] This scale contains 16 items that cover three dimensions: metacognition (5 items), motivation (6 items), and behavior control (5 items), with a five-point Likert format (1 = strongly disagree to 5 = strongly agree). The range of total scores theoretically ranges from 16 to 80. In the research data, the observed score range was 32–88. This discrepancy is caused by a scoring system that uses an average score per dimension which is then converted to a scale of 100 for ease of interpretation (final range of 20–100), so that the total score is the sum of the three dimensions that have been converted. Through this conversion, the theoretical minimum score becomes 60 (3 dimensions × 20) and the maximum score becomes 300 (3 dimensions × 100). However, in order to maintain alignment with the original scale, the total score in this study was divided by 3 so that it returned to the equivalent range of a scale of 16–80. The actual range of 32–88 observed in the data reflects the absence of respondents at absolute extremes, a phenomenon prevalent in psychological measurements.

The validity of the instrument content was tested through expert judgment, while the validity of the construct was tested using Exploratory Factor Analysis (EFA) using the Principal Component Analysis (PCA) method and Varimax rotation. The EFA's findings show that the whole grain is clustered in harmony with the three hypothetical dimensions, with the loading factor value moving between 0.53 and 0.81—all of which exceed the 0.50 threshold. A Kaiser-Meyer-Olkin (KMO) value of 0.84 and a significant Bartlett's Test of Sphericity ($p < 0.001$) confirmed the adequacy of the sample for factor analysis. The three factors that were formed cumulatively explained 58.7% of the total variance. The reliability of the instrument is estimated using Cronbach's Alpha coefficient. The total reliability of the scale of 0.82 (> 0.70) indicates satisfactory internal consistency. Reliability per dimension also met the recommended thresholds: metacognition ($\alpha = 0.80$), motivation ($\alpha = 0.78$), and behavioral control ($\alpha = 0.81$). The results of

[20] Zimmerman, 'Becoming a Self-Regulated Learner'; Pintrich, 'The Role of Goal Orientation in Self-Regulated Learning'.

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the EFA along with the reliability per dimension are presented in full in the supplementary material (Table S1).

Second, the academic achievement variable is measured objectively through the student's last GPA[21], which is considered more representative because it reflects the accumulation of learning outcomes over a long temporal span. It should be emphasized that GPA as a measure of academic achievement is not completely free from factors outside of student capabilities, such as institutional assessment policies, course difficulty levels, and variability between lecturers in assessment practices. These limitations are recognized as an inherent consequence of the use of administrative data that cannot be fully controlled in this research design.

4. Data Analysis

Data analysis is taken in stages. First, descriptive analysis to describe the characteristics of respondents and the distribution of variables. Before hypothesis testing, a classical assumption test was carried out which included: (1) normality test with Kolmogorov-Smirnov, (2) linearity test with ANOVA, and (3) heteroscedasticity test with residual scatter plot. To strengthen the evidence of normality in large samples (N = 180), skewness (0.31) and kurtosis (-0.42) values were also examined, both of which are in the acceptable range of -2 to +2.[22] The entire assumption is met. Hypothesis testing used simple linear regression to estimate the coefficient of determination (R^2) as well as the significance of the influence of self-regulation on academic achievement. The entire data processing process is done with SPSS software version 26.

RESULTS AND DISCUSSION

Results

This research involved 180 students as respondents to test whether self-regulation capacity predicts academic achievement. The analysis was taken in three stages: descriptive, classical assumption test (normality and linearity), and hypothesis test (simple linear regression).

1. Descriptive Analysis

An overview of the distribution of research variable data is presented in the following table:

Table 1. Descriptive Statistics of Research Variables (N=180)

Variable	Minimum	Maximum	Mean	Std. Deviation

[21] Steinmayr et al., *Academic Achievement*.
[22] Darren George and Paul Mallery, *IBM SPSS Statistics 29 Step by Step: A Simple Guide and Reference*, 18th edn (Routledge, 2024), https://doi.org/10.4324/9781032622156.

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Self-Regulation (X)	32,00	88,00	64,50	11,25
Academic Achievement (Y)	2,25	3,85	3,35	0,35

Referring to Table 1, the average score of student self-regulation capacity was recorded at 64.50. As elaborated in the Methods section, the score range of 32–88 is the product of conversion from a raw score to a broader scale through the specific scoring system described earlier. Considering that the average of 64.50 occupies the range of 80.6% of the initial scale theoretical maximum (80), this data suggests a fairly high level of learning independence among respondents. Meanwhile, the average student academic achievement (GPA) is perched at 3.35 out of a scale of 4.00, which collectively reflects very satisfactory academic achievements. However, this high average GPA needs to be interpreted carefully considering the potential influence of institutional assessment policies, the level of course difficulty, or the characteristics of the sample that are classified as academically capable. These limitations are recognized as part of the generalizability of the findings.

2. Classic Assumption Test

The normality test is carried out to ensure that the data residue is distributed normally as a prerequisite for the application of parametric statistics.

Table 2. Normality Test Results (One-Sample Kolmogorov-Smirnov)

Information	Unstandardized Residual
N	180
Test Statistic	0,052
Asymp. Sig. (2-tailed)	0,200

The findings in Table 2 show the value of Asymp. Sig. (2-tailed) of 0.200 ($p > 0.05$), which confirms that the data residue is distributed normally. To strengthen the evidence of normality in large samples (N = 180), skewness (0.31) and kurtosis (-0.42) values were also examined, both of which are contained in the acceptable range of -2 to +2 (George & Mallery, 2010). Thus, regression analysis can be continued.

Furthermore, a linearity test was taken to verify that the regression model used was correct in describing the relationships between variables.

Table 3. Linearity Test Results (ANNOVA Table)

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Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups (Combined)	16,342	45	0,363	4,215	0,000
Linearity	5,124	1	5,124	59,581	0,000
Deviation from Linearity	11,218	44	0,255	2,965	0,082
Whitin Groups	11,524	134	0,086		
Total	27,866	179			

Based on the results of the analysis in Table 3, a significance value was obtained on the linearity line of 0.000 ($p < 0.05$), which indicates the existence of a significant linear relationship between self-regulatory capacity and academic achievement of students. Furthermore, the significance value on the line of Deviation from Linearity displays a number of 0.082 ($p > 0.05$), which confirms that the linear model specifications proposed in this research are appropriate and feasible to be used to predict academic achievement based on self-regulatory variables. With the fulfillment of the assumptions of normality and linearity, hypothesis testing through simple linear regression analysis can be declared statistically valid.

3. Hypothesis Test (Regression Analysis)

The essence of this research is to estimate the extent to which variable X predicts variable Y. The results of the determination coefficient test and significance test are presented as follows:

Table 4. Coefficient of Determination (R^2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,458	0,210	0,205	0,312

Referring to Table 4, the R^2 value of 0.210 was obtained. This finding provides an empirical answer that self-regulatory capacity explains 21% of the variance in student academic achievement at STAI Darul Hikmah Bangkalan. Referring to the convention of effect size in the social sciences, this value falls into the category of moderate effects (Cohen, 1988).[23]

Table 5. Regression Coefficient Significance Test (t-test)

Model	Unstandardized B	Std. Error	t	Sig.

[23] Jacob Cohen, 'A Power Primer', *Psychological Bulletin* 112, no. 1 (1992): 155–59, https://doi.org/10.1037/0033-2909.112.1.155.

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(Constant)	2,431	0,136	17,913	0,000
Self-Regulation	0,014	0,002	6,875	0,000

The t-test findings in Table 5 show a significance value of 0.000 ($p < 0.05$). Thus, the research hypothesis is accepted: self-regulatory capacity significantly predicts students' academic achievement (B = 0.014, t = 6.875). The non-standardized regression coefficient (B = 0.014) indicates that every one-point increase in the self-regulation score predicts an increase in GPA of 0.014 points. With an observed self-regulation score range of 56 points (32–88), the maximum possible contribution of this variable to GPA improvement is about 0.78 points—a difference that is practically significant considering that the student GPA in this study moved in a relatively limited range (2.25–3.85).

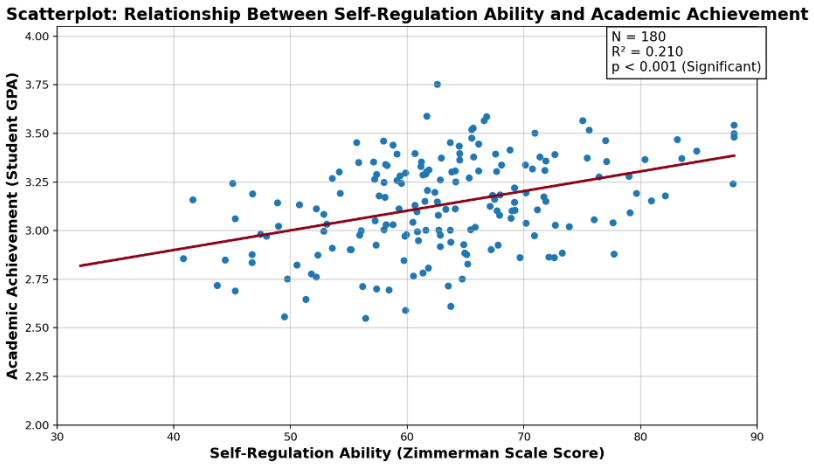


Figure 1. Scatter Plot Linear Relationship between Self-Regulation and Academic Achievement

Visually, the pattern of relationship between the two variables is seen in Figure 1, where the blue dots representing student data are scattered from the bottom left to the upper right, in the direction of the regression red diagonal line. This pattern presents convincing visual evidence that there is a positive relationship between the two variables: the higher the student's self-regulation capacity, the higher his academic achievement. However, the distribution of data that is not exactly attached to the red line indicates that the strength of this relationship is at a moderate level, as confirmed by the R^2 value of 0.210. This condition indicates that although self-regulation is an important predictor, there are still other factors outside this research model at 79% that also affect the variance in academic achievement of STAI Darul Hikmah Bangkalan students, such as intrinsic motivation, teaching quality, social support, and other contextual variables.

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Discussion

1. Interpretation of Key Findings

The data analysis in this research presents an empirical affirmation that self-regulation capacity is a significant predictor of student academic achievement in Islamic universities. The determination coefficient (R^2) of 0.210 shows that self-regulation explains 21% of the variance in the GPA of STAI Darul Hikmah Bangkalan students. Referring to the conventional guidelines of Cohen (1988), this value is contained between the categories of moderate (0.13) and large (0.26) effects, confirming that this contribution is not only statistically significant, but also practically significant. The regression coefficient ($B = 0.014$; $p < 0.000$) indicates that every one-point increase in the self-regulation score predicts an escalation of GPA of 0.014 points. With a self-regulation score range of 56 points (32–88), the maximum possible contribution is 0.78 points—a substantial difference considering that students' GPAs move in a relatively limited range (2.25–3.85). These findings are in line with a meta-analysis that confirms that independent learning strategies are one of the most important noncognitive predictors of GPA in various higher education contexts.[24]

2. Theoretical Contributions: Extending Zimmerman's SRL Model to the Context of Islamic Education

Theoretically, these findings reinforce the self-regulated learning (SRL) framework in which students with high self-regulation scores (mean = 64.50) tend to be more effective in carrying out the cycle of forethought, performance, and self-reflection.[25] These findings also support the perspective on the integration of cognition, motivation, and behavioral regulation as the foundation of learning success.[26]

Nevertheless, the most fundamental theoretical contribution of this research lies in the expansion of the SRL Zimmerman model into the context of Islamic education that has never been taken before. To date, Zimmerman's SRL model has been extensively tested in the context of Western secular education, but it has not been validated in the context of Islamic colleges that integrate religious and science curricula. This research provides the first empirical evidence that Zimmerman's three-phase model remains relevant and predictive in such contexts, albeit with discrete reinforcement mechanisms.

What distinguishes the effectiveness of SRL at STAI Darul Hikmah Bangkalan from the context of secular education is the integration of Islamic values into each phase of self-regulation.

[24] Richardson et al., 'Psychological Correlates of University Students' Academic Performance'.
[25] Zimmerman, 'Becoming a Self-Regulated Learner'.
[26] Pintrich, 'The Role of Goal Orientation in Self-Regulated Learning'.

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In the forethought phase, students do not only set academic goals, but also instill tawakkal the belief that after maximum effort, the final result is left to Allah.[27] In the pesantren environment, independence is actually interpreted as hard work accompanied by tawakkal and ihsan after effort.[28] This kind of belief reduces anxiety about failure and strengthens students' intrinsic motivation when designing learning strategies. In the performance phase, the value of istiqamah is the main principle that encourages students to consistently carry out learning strategies despite facing the burden of a dual curriculum that integrates religious and scientific sciences[29], while sabr provides endurance in the face of academic frustration. The concepts of sabr, tawakkul, and istiqamah from the Qur'an are even directly linked to grit long-term perseverance that is a predictor of success beyond cognitive capacity.[30] In the self-reflection phase, structured muhasabah practices—as applied in Islamic boarding schools through the Al-Ghazali method that combines muraqabah and muhasabah in learning activities and daily life have been proven to strengthen students' discipline, responsibility, honesty, and social propriety.[31]

This integration shows that in the context of Islamic education, SRL is not only psychological, but also spiritual. Islamic values do not replace the SRL mechanism, but rather function as a reinforcement layer that deepens each phase. Thus, this research proposes an extended SRL model, in which spiritual values play a role as moderators that reinforce the effectiveness of each phase in the Zimmerman cycle. This model opens up space for the development of SRL theories that are more culturally sensitive and relevant to the context of religion-based education.

3. Why Is Self-Regulation So Important in Islamic Colleges?

The finding that SRL explains the 21% variance in GPA at STAI Darul Hikmah needs to be understood in the context of the unique challenges faced by students at this institution. First, STAI students undergo a dual curriculum that integrates religious science (tafsir, hadith, fiqh) with general science (economics, management, educational psychology). The cognitive load of these two

[27] Wawan Arbeni, *Pendidikan Psikospiritual Perspektif Islam di Pesantren* (UMSU Press, 2026).
[28] Badruzzaman M. Yunus et al., 'Independence of Santri: Exploring the Teachings of the Quran for the Awakening of the Spirit', *Socio Politica : Jurnal Ilmiah Jurusan Sosiologi* 14, no. 2 (2024): 57–66, https://doi.org/10.15575/socio-politica.v14i2.40635.
[29] Sri Haryanto et al., 'Uniting Tradition and Modernity: Scientific Paradigms of Pesantren-Based Universities', *Nazhruna: Jurnal Pendidikan Islam* 7, no. 3 (2025): 684–704, https://doi.org/10.31538/nzh.v7i3.48.
[30] Ubaidillah Ubaidillah et al., 'Fostering Perseverance through Qur'anic Teachings: The Relevance of Grit in Islamic Education', *EDUKASIA Jurnal Pendidikan Dan Pembelajaran* 5, no. 2 (2024): 607–20, https://doi.org/10.62775/edukasia.v5i2.1709.
[31] Fauzi Sastra Efendi and Ahmad Rifauzi, 'Implementasi Metode Pendidikan Akhlak Imam Al-Ghazali Dalam Peningkatan Perilaku Positif Siswa Di MTsS Pesantren Darul Ulum Tigo Jangko Lintau Buo', *TSAQOFAH* 5, no. 5 (2025): 5397–411, https://doi.org/10.58578/tsaqofah.v5i5.7073.

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different scientific domains requires a more complex time allocation and learning management strategy than students in public universities who focus on only one discipline. Second, most students are rooted in the tradition of Islamic boarding schools with traditional learning patterns centered on kiai, so the transition to autonomous learning in higher education is a significant pedagogical challenge. Third, social pressure from families and communities so that students not only excel academically, but also become moral and spiritual role models, adding to the burden of expectations that must be managed simultaneously.

It is in this context that self-regulation becomes very crucial. Students who are able to set learning goals clearly (forethought), consistently implement strategies in the midst of double burden (performance), and regularly evaluate their progress (self-reflection) will be better able to bridge curricular demands, pedagogical transitions, and social expectations at the same time. These findings are consistent with the argument that SRL interventions are most effective precisely in student populations that face high academic demands and challenging learning transitions.[32]

4. Comparison with Empirical Studies in Similar Contexts

If placed within the spectrum of empirical findings in the Islamic education environment, SRL's contribution of 21% in this research is in a reasonable and meaningful position. In PGMI students of the Faculty of Islamic Religion, SRL's contribution to the cumulative GPA was reported to be larger, namely 42.7%.[33] This disparity can be explained by the homogeneity of the sample in one study program, while this research involves students across study programs (Islamic Religious Education and Sharia Economics) with a more heterogeneous variety of curricular demands. In modern Islamic boarding schools, SRL's contribution to academic adjustment was found to be 31.47%.[34] Although the dependent variables are different, the magnitude of this contribution confirms that SRL is a stable and substantial predictor of various types of academic outcomes in Islamic education.

SRL's contribution in reducing academic procrastination was reported to be 31.8% and 42.1%, respectively.[35] Although the dependent variables are different from this research, these

[32] Theobald, 'Self-Regulated Learning Training Programs Enhance University Students' Academic Performance, Self-Regulated Learning Strategies, and Motivation'.
[33] Ika Wulan Ramadhani and Nurfi Laili, 'The Relationship Between Self-Regulated Learning and Academic Achievement on the College Students of Universitas Muhammadiyah Sidoarjo, Indonesia', *Indonesian Journal of Islamic Studies* 5 (August 2021), https://doi.org/10.21070/ijis.v5i0.1588.
[34] Ulfa Hannani and Clara Ajisuksmo, 'The Relationship of Self Regulated Learning with Academic Adjustment of Seventh Grade Santri of Pondok Pesantren', *TAZKIYA: Journal of Psychology* 9, no. 2 (2021): 107–21, https://doi.org/10.15408/tazkiya.v9i2.17196.
[35] Nani Handayani, 'Pengaruh Regulasi Diri Terhadap Prokrastinasi Akademik Mahasiswa Di Pondok Pesantren Al Munawwir Yogyakarta', *Acta Psychologia* 4, no. 1 (2023): 80–87, https://doi.org/10.21831/ap.v4i1.52471; Yoga

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findings collectively reinforce SRL's position as a construct that has a systemic impact on various aspects of Muslim student learning behavior in Indonesia. To the best of the author's knowledge, this research is the first study to report the R^2 value for the influence of SRL on GPA in the context of STAI in Madura, thus contributing an original contribution to the still limited literature.

The effect of self-regulation in the context of Islamic education is also not limited to GPA achievement. The integration of values such as tawakkul, sabr, and gratitude in religious education has been proven to strengthen emotional resilience, reduce stress and anxiety, and improve the psychological well-being of students.[36] The psychotheological learning model that integrates tawakal, patience, gratitude, and pleasure has also been proven to be able to build adolescents' mental resilience in madrasas.[37] These findings show that self-regulation mechanisms reinforced by Islamic values have a systemic impact, not only on the cognitive dimension, but also on students' mental health and psychological resilience.

5. Factors Outside the Model and Research Limitations

The fact that 79% of GPA variance is explained by factors outside the model indicates the importance of considering additional variables. In modern Islamic boarding schools, social support and teachers are emphasized as significant factors that complement self-regulation.[38] The integration of spiritual values also plays a role in building emotional resilience which is very likely to contribute to academic achievement.[39] Furthermore, grit rooted in the values of the Qur'an is a predictor of long-term perseverance that is not captured by conventional SRL instruments.[40] Referring to a comprehensive taxonomy of GPA determinants in Asia—which, while not specifically addressing SRL, provides a useful classification framework—variables outside of SRL in this research can include demographic dimensions, institutional environment, as well as behavioral factors that collectively affect academic achievement in college.[41]

Achmad Ramadhan et al., 'Peran Regulasi Diri Dalam Belajar Terhadap Prokrastinasi Akademik Pada Siswa Madrasah Tsanawiyah', *Jurnal Psikologi Integratif* 11, no. 1 (2023): 87, https://doi.org/10.14421/jpsi.v11i1.2757.

[36] Muhammadu Ibrahim Nasrin, 'The Influence of Islamic Spiritual Values on Students' Mental Health: A Special Focus on Tawakkul (توكُّل), Sabr (صبر) and Shukr(شكر)', *LECTURES: Journal of Islamic and Education Studies* 4, no. 2 (2025): 260–72, https://doi.org/10.58355/lectures.v4i2.150.

[37] Muhammad Zamzam and Winsidi Winsidi, 'Psycho-Theological Learning Model to Improve Mental Resilience in Muslim Adolescents', *Scaffolding: Jurnal Pendidikan Islam Dan Multikulturalisme* 6, no. 3 (2024): 502–16, https://doi.org/10.37680/scaffolding.v6i3.7639.

[38] Hannani and Ajisuksmo, 'The Relationship of Self Regulated Learning with Academic Adjustment of Seventh Grade Santri of Pondok Pesantren'.

[39] Muhammadu Ibrahim Nasrin, 'The Influence of Islamic Spiritual Values on Students' Mental Health'; Zamzam and Winsidi, 'Psycho-Theological Learning Model to Improve Mental Resilience in Muslim Adolescents'.

[40] Ubaidillah et al., 'Fostering Perseverance through Qur'anic Teachings'.

[41] Khanitta Meepradit and Nattawut Leelakanok, 'Factors Affecting GPA in Higher Education in Asia: A Systematic Review', *International Journal of Early Childhood Special Education* 14 (April 2022): 1581–91, https://doi.org/10.9756/INT-JECSE/V14I1.190.

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In addition to these factors, this research has a number of limitations that need to be acknowledged. First, the cross-sectional design applied has not been able to draw definitive causality conclusions. Second, the use of self-filled questionnaires has the potential to cause subjectivity and social desirability bias, where respondents may tend to report a higher level of self-regulation than actual conditions. The relationship between SRL and achievement is also sometimes mediated by students' perception of the learning environment.[42] Third, the relatively limited GPA range (2.25–3.85) and high average (3.35) indicate the possibility of a range restriction that can reduce the sensitivity of the analysis, as well as the potential for value inflation that affects the generalizability of the findings. Fourth, this research does not control for students' initial academic capacity, such as entrance exam scores or first-semester GPAs, so SRL's unique contribution beyond initial ability cannot be estimated in isolation. Fifth, the sample is only sourced from one institution (STAI Darul Hikmah Bangkalan), so generalizability to other Islamic universities is still limited. Sixth, the inconsistency of the self-regulation score range (32–88) that has been elaborated in the Methods section needs to be a concern in the interpretation of findings and the development of the instrument further.

6. Practical Implications

These findings encourage structured and specific interventions for each stakeholder at STAI Darul Hikmah Bangkalan and similar institutions.

For lecturers, teaching strategies need to be designed to explicitly grow SRL. Some concrete strategies include: (1) providing formative feedback in a feed-forward nature, where lecturers not only point out mistakes, but also provide specific suggestions for improvement in the next assignment; (2) implement a transparent assessment rubric and be shared with students from the beginning of the semester so that they can carry out accurate self-evaluations; (3) inserting metacognitive questions at the end of each lecture session, such as "What have you learned today?" and "What strategies will you use to deepen this material?"; (4) assign brief post-exam reflective tasks so that students are accustomed to analyzing their own study strategies; and (5) become role models of self-regulation by openly demonstrating how lecturers plan, monitor, and evaluate their own teaching process.

For curriculum managers, SRL training modules can be integrated into self-development courses or new student orientation programs. This training includes: (1) a goal setting workshop at

[42] Dang et al., 'Khám Phá Mối Liên Hệ Giữa Học Tập Tự Điều Chỉnh Và Tự Đánh Giá Kết Quả Học Tập Trong Môi Trường Học Tập Kết Hợp - Exploring the Relationship Between Self-Regulated Learning and Students' Self-Evaluation Academic Achievement Towards Blended Learning Environment.'

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the beginning of the semester to train students to design specific, measurable, and realistic learning targets; (2) the application of a weekly reflective journal as a component of formative assessment in several core courses; (3) peer mentoring programs that pair senior students with high SRL ability with new students who need learning transition support; (4) integration of time management materials and learning strategies into compulsory courses in the first semester; and (5) the provision of academic consultation clinics that specifically assist students who have difficulties in managing the double curriculum load.

For students, the use of evidence-based learning techniques can strengthen each phase of SRL: (1) self-quizzing and distributed practice to strengthen material retention; (2) Pomodoro techniques for daily time management; (3) the formation of a learning group that monitors each other's progress (accountability groups); (4) the use of task management applications to track deadlines and priorities; and (5) daily muhasabah practices that not only evaluate academic progress, but also the spiritual aspects of the learning process.

For institutions, strengthening SRL-based academic guidance that consciously integrates Islamic values such as muhasabah and istiqamah can be the uniqueness of STAI Darul Hikmah Bangkalan in producing graduates who are not only academically superior, but also have solid learning independence and are rooted in spiritual values. This program can be used as a competitive advantage for institutions in attracting the interest of prospective students and increasing the accreditation of study programs.

7. Further Research Direction

Based on the findings and limitations that have been described, a number of further research directions are recommended. First, longitudinal research is needed to test the causality between SRL and GPA, for example by measuring SRL at the beginning of the semester and GPA at the end of the semester repeatedly over several academic periods. Second, qualitative studies through in-depth interviews with students who have high and low SRL scores can reveal the specific mechanisms of how Islamic values interact with self-regulation strategies in daily academic life. Third, cross-institutional research involving several STAI, IAIN, or UIN in Madura and East Java will increase the generalizability of findings and facilitate comparative analysis between contexts. Fourth, the development and validation of culturally sensitive SRL scales—which explicitly include spiritual dimensions such as muhasabah and tawakkal—is a crucial step for further research in the context of Islamic education. Fifth, the inclusion of moderator and mediator variables such as religiosity, self-efficacy, family support, and Islamic value-based grit will provide a more comprehensive understanding of the mechanisms that link SRL to academic achievement. Sixth,

validation of the SRL scale using Confirmatory Factor Analysis (CFA) on a larger and more diverse sample is needed to confirm the three-factor structure found in the EFA of this research. Seventh, experimental studies designed by pretest-posttest control groups can test the effectiveness of SRL interventions based on Islamic values that have been proposed in practical implications.

CONCLUSIONS

This research concludes that self-regulatory capacity significantly predicts the academic achievement (GPA) of students at STAI Darul Hikmah Bangkalan, by explaining the 21% variance in GPA ($R^2 = 0.210$; $B = 0.014$; $p < 0.000$). Theoretically, these findings extend the SRL model to the context of Islamic universities in Indonesia by showing that spiritual values—tawakkal, istiqamah, sabr, and muhasabah—function as a reinforcement layer in each phase of self-regulation. In practice, institutions are recommended to implement a mandatory SRL workshop of 2 credits in the first semester which includes goal setting, reflective journals, and peer mentoring. Given the cross-sectional design and the single institutional sample, causality conclusions cannot be drawn. Further research needs to adopt a longitudinal design, expand the sample to several STAI and UIN, and include religiosity as a potential moderator.

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SUPPLEMENTARY MATERIAL

Table S1. Results of Exploratory Factor Analysis (EFA) Self-Regulation Scale (N=180)
Method: Principal Component Analysis (PCA) with Varimax Rotation
A. Component Matrix After Rotation

No. Item	Theoretical Dimension	Factor 1: Metacognition	Factor 2: Motivation	Factor 3: Behavioral Control
1	Metacognition	**0,74**	0,15	0,12
2	Metacognition	**0,70**	0,22	0,08
3	Metacognition	**0,67**	0,10	0,19
4	Metacognition	**0,72**	0,18	0,14
5	Metacognition	**0,65**	0,09	0,21
6	Motivation	0,20	**0,76**	0,11
7	Motivation	0,14	**0,71**	0,17
8	Motivation	0,08	**0,68**	0,23

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9	Motivation	0,19	**0,73**	0,09
10	Motivation	0,22	**0,63**	0,15
11	Motivation	0,11	**0,55**	0,28
12	Behavior Control	0,16	0,19	**0,78**
13	Behavior Control	0,09	0,13	**0,81**
14	Behavior Control	0,21	0,17	**0,69**
15	Behavior Control	0,13	0,24	**0,72**
16	Behavior Control	0,18	0,10	**0,74**

Remarks: The boldly printed factor loading value shows the items grouped on factors that correspond to the theoretical dimensions. All loading factor values are above the 0.50 threshold.

B. Summary of Sufficiency and Validity Index Factor Analysis

Index	Value	Criteria	Description
KMO (Kaiser-Meyer-Olkin)	0,84	> 0,50	Adequate
Bartlett's Test of Sphericity (χ^2)	1246,35	$p < 0,05$	Significant ($p < 0,001$)
df	120	-	-

C. Total Variance Explained

Factor	Initial Eigenvalue	% Variance	% Cumulative
1 (Metacognition)	3,42	21,4%	21,4%
2 (Motivation)	3,18	19,9%	41,3%
3 (Behavior Control)	2,79	17,4%	58,7%

D. Reliability per Dimension

Dimensions	Grain Quantity	Cronbach's Alpha
Metacognition	5	0,80
Motivation	6	0,78
Behavior Control	5	0,81

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Total Scale	**16**	**0,82**

Interpretation:
The results of the EFA show that all 16 items of the self-regulation scale are clearly grouped into three factors according to the hypothetical theoretical dimensions, namely metacognition (5 items), motivation (6 items), and behavior control (5 items). The value of the loading factor of the whole grain moves between 0.55 and 0.81, exceeding the minimum threshold of 0.50. A KMO value of 0.84 confirmed the sufficiency of the sample for factor analysis, and the significant Bartlett's Test ($p < 0.001$) confirmed that the correlation matrix is not an identity matrix. The three factors that were formed cumulatively explained 58.7% of the total variance. The reliability of each dimension ranges from 0.78–0.81 and the total reliability of the scale is 0.82, all of which are above the 0.70 threshold. These findings confirm that the three-factor structure of the self-regulation scale is valid and reliable to be used in the context of STAI Darul Hikmah Bangkalan students.

Table S2. Sample Distribution per Stratum (N=180)

Study Program	Semester 3	Semester 5	Semester 7	Total
Islamic Religious Education	35	32	28	95
Sharia Economics	30	28	27	85
Total	**65**	**60**	**55**	**180**