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Data Analytics–Based Evaluation of Student Perceptions of Learning Quality in Islamic Higher Education

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ABSTRACT

This study employs an integrated data analytics approach to examine student perceptions of learning quality at the Faculty of Islamic Economics and Business (FEBI), IAIN Lhokseumawe. The analytical framework combines descriptive statistics, K-Means clustering, and multiple linear regression to provide a comprehensive evaluation of instructional quality. Data were collected from 805 active undergraduate students using a structured questionnaire measuring nine learning quality indicators related to instructional delivery, lecturer competence, communication, assessment practices, and institutional compliance. The findings indicate that students generally perceive the quality of learning positively, with an overall mean score of 4.32 on a five-point Likert scale. Lecturer's Mastery of Material and Accuracy in Answering Questions emerged as the highest-rated indicators, while Material Suitability with the Semester Learning Plan (RPS) and Transparency of Assessment Criteria received comparatively lower scores. Regression results show that instructional quality indicators significantly influence overall student satisfaction, with assessment transparency as the strongest predictor and material suitability with the RPS as the weakest. These results highlight the importance of transparent assessment practices and consistent alignment between instructional materials and the RPS in shaping students' learning experiences, enhancing student trust, reducing uncertainty, and sustaining educational quality in Islamic higher education.

Keywords: *Student Perception, Learning Quality, Assessment Transparency, Islamic Higher Education*

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ABSTRAK

Penelitian ini menggunakan pendekatan analitik data terintegrasi untuk mengkaji persepsi mahasiswa terhadap kualitas pembelajaran di Fakultas Ekonomi dan Bisnis Islam (FEBI) IAIN Lhokseumawe. Kerangka analisis mengombinasikan statistik deskriptif, *K-Means clustering*, dan regresi linear berganda untuk memberikan evaluasi yang komprehensif terhadap kualitas pembelajaran. Data dikumpulkan dari 805 mahasiswa sarjana aktif melalui kuesioner terstruktur yang mengukur sembilan indikator kualitas pembelajaran yang mencakup pelaksanaan pembelajaran, kompetensi dosen, komunikasi, praktik penilaian, serta kepatuhan institusional. Hasil penelitian menunjukkan bahwa mahasiswa secara umum menilai kualitas pembelajaran secara positif, dengan skor rata-rata keseluruhan sebesar 4,32 pada skala Likert lima poin. Penguasaan materi oleh dosen dan ketepatan dalam menjawab pertanyaan menjadi indikator dengan penilaian tertinggi, sementara kesesuaian materi dengan Rencana Pembelajaran Semester (RPS) dan transparansi kriteria penilaian memperoleh skor yang relatif lebih rendah. Hasil analisis regresi menunjukkan bahwa indikator kualitas pembelajaran berpengaruh signifikan terhadap kepuasan mahasiswa secara keseluruhan, dengan transparansi penilaian sebagai prediktor terkuat dan kesesuaian materi dengan RPS sebagai prediktor terlemah. Temuan ini menegaskan pentingnya praktik penilaian yang transparan serta konsistensi keselarasan antara materi pembelajaran dan RPS dalam membentuk pengalaman belajar mahasiswa, meningkatkan kepercayaan, mengurangi ketidakpastian, dan menjaga keberlanjutan mutu pendidikan di lingkungan perguruan tinggi Islam.

Kata Kunci: *Persepsi Mahasiswa, Kualitas Pembelajaran, Transparansi Penilaian, Pendidikan Tinggi Islam*

INTRODUCTION

The quality of learning in higher education is a key determinant of graduate competence and institutional reputation, particularly within an increasingly competitive global academic environment. In specialized disciplines such as Islamic Economics and Business, instructional effectiveness and academic services are closely linked to the ability of institutions to produce professionally competent and ethically grounded graduates (Mustapha et al., 2023). In this context, student perceptions serve as a core component of quality assurance, reflecting students' role as primary stakeholders in evaluating instructional quality.

The assessment of learning quality is commonly grounded in established theoretical frameworks, including the SERVQUAL model and Bloom's Taxonomy. SERVQUAL evaluates academic service quality by examining the alignment between student expectations and perceived performance across dimensions such as assurance and reliability (Dong, 2023; Syed & Albalawi,

2024). Meanwhile, Bloom's Taxonomy provides a hierarchical structure for assessing learning outcomes, from basic cognitive understanding to higher-order analytical skills, which is particularly relevant in analytically intensive fields such as Islamic Economics and Business (Tawafak et al., 2023).

Alongside these frameworks, the integration of Data Analytics (DA) has become increasingly important in higher education to support evidence-based decision-making and enhance institutional understanding of student learning experiences (Ferguson, 2012; Kero & Endebu, 2023). Prior studies indicate that DA facilitates policy formulation, improves resource allocation, and enables the identification of learning patterns that inform targeted academic interventions (Murumba & Micheni, 2017; Syed & Albalawi, 2024). When combined with advanced evaluation models, DA also strengthens institutional capacity to assess instructional quality and its impact on student behavior and outcomes (Daniel, 2014; Muthmainnah et al., 2023).

Despite these developments, learning quality evaluation at the Faculty of Islamic Economics and Business (FEBI), IAIN Lhokseumawe, remains largely dependent on descriptive analyses of student perception surveys. This approach limits the faculty's ability to conduct predictive and diagnostic assessments related to curriculum alignment, instructional effectiveness, and student satisfaction (Kaliisa et al., 2022; Ndukwe & Daniel, 2020). Recent research highlights the need for integrating advanced data analytics with contextual institutional analysis to support sustainable improvements in teaching quality and curriculum design (Shashidhar et al., 2019; Togher & Fenech, 2020).

Addressing this gap, the present study investigates the application of Data Analytics to evaluate student perceptions of learning quality at FEBI IAIN Lhokseumawe. Specifically, it examines how K-Means clustering can be used to identify homogeneous groups of student perceptions and to what extent instructional quality indicators predict overall student satisfaction through Multiple Linear Regression analysis. By integrating cluster-based segmentation and predictive modeling, this study provides a data-driven diagnostic assessment of instructional quality and identifies institutional strengths and areas requiring improvement (Ashraf et al., 2025; Hod et al., 2019).

The findings are expected to support data-driven curriculum optimization and lecturer professional development within FEBI. Moreover, this study contributes to the literature on higher education evaluation by proposing a data analytics–based model for continuous quality improvement in Islamic Economics and Business education, emphasizing the integration of

pedagogical competence, technological capacity, and ethical values as foundations of sustainable instructional excellence.

METHOD

This study employed a quantitative research design to evaluate instructional quality at the Faculty of Islamic Economics and Business (FEBI), IAIN Lhokseumawe, during the Odd Semester of the 2024/2025 academic year. The population comprised active undergraduate students enrolled at FEBI, selected using purposive sampling with inclusion criteria requiring official course registration and a minimum of 50% class attendance. A total of 805 valid student responses were included in the analysis, with multi-response entries permitted to allow evaluation of more than one course and lecturer.

Data were collected using a structured questionnaire with a five-point Likert scale, measuring nine instructional quality indicators grouped into five dimensions: transparency of learning implementation (including RPS delivery and assessment systems), suitability of instructional materials, lecturer mastery of subject matter, communication etiquette, and compliance with schedules and fairness in academic processes. Overall student satisfaction was treated as the dependent variable.

Instrument validity was assessed using Pearson Product–Moment correlation, with all items meeting the significance criterion ($p < 0.05$). Reliability testing demonstrated high internal consistency, with a Cronbach's Alpha coefficient of 0.912, exceeding accepted thresholds for social science research.

Data analysis was conducted in three stages. First, incomplete responses were screened, and indicator values were normalized using Min–Max Scaling to ensure comparability across variables. Second, K-Means clustering was applied to identify patterns in student perceptions, with the optimal number of clusters determined using the Elbow Method and Silhouette Score and verified through ANOVA. Third, Multiple Linear Regression analysis was used to examine the influence of instructional quality indicators on overall student satisfaction. Classical assumption tests, including normality, multicollinearity, and heteroscedasticity, were performed to ensure model robustness.

RESULTS AND DISCUSSION

Result

This study examined student perceptions of instructional quality at the Faculty of Islamic Economics and Business (FEBI), IAIN Lhokseumawe, based on responses from 805 undergraduate students. Data were collected using a structured questionnaire consisting of nine instructional quality indicators measured on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

Descriptive Analysis of Student Perceptions

Overall, the descriptive findings indicate a high level of student agreement across all evaluated indicators. For the indicator *Accuracy in Answering Questions*, 510 respondents selected "Agree" and 256 selected "Strongly Agree." Similarly, *Lecturer's Mastery of Material* received 539 "Agree" and 232 "Strongly Agree" responses, reflecting strong student confidence in lecturers' subject-matter competence.

In contrast, the indicator *Material Suitability with the RPS (Syllabus)* recorded the highest proportion of neutral responses, with 30 students selecting the neutral category. Nevertheless, most respondents still expressed positive perceptions, with 497 selecting "Agree" and 250 selecting "Strongly Agree."

Distribution of Student Responses by Indicator

Table 1 presents the distribution of student responses across the nine instructional quality indicators, including average scores and the proportion of positive, neutral, and negative responses.

Table 1. Distribution of Student Responses Based on Instructional Quality Indicators

Indicator	Average Score	Positive Response (%)	Neutral (%)	Negative Response (%)
RPS Delivery	4.32	94.0	3.1	2.9
Transparency of Assessment Criteria	4.29	93.5	2.2	4.3
Relevance of Material to RPS	4.29	93.5	3.7	2.8
Relevance of Exam Questions	4.32	94.0	2.4	3.6
Lecturer's Mastery of Material	4.43	95.5	1.6	2.9
Accuracy in Answering Questions	4.43	95.5	2.1	2.4

Indicator	Average Score	Positive Response (%)	Neutral (%)	Negative Response (%)
Lecturer's Language Politeness	4.38	94.9	1.7	3.1
Adherence to Schedule	4.32	94.0	2.4	3.6
Conformity of Assessment with Contract	4.36	96.0	1.5	1.5

As shown in table 1, the highest average scores were observed for Lecturer's Mastery of Material and Accuracy in Answering Questions, both achieving a mean score of 4.43 and a positive response rate of 95.5%. These indicators demonstrate strong lecturer competence in content delivery and responsiveness to student inquiries.

Conversely, Material Suitability with the RPS (Syllabus) recorded one of the lowest mean scores (4.29), accompanied by 3.7% neutral and 2.8% negative responses. Although the overall perception remains positive, this indicator reflects a relatively weaker alignment between instructional materials and the formal syllabus in certain courses.

Overall Assessment of Instructional Quality

Across all nine indicators, the aggregate mean score was 4.32 out of a maximum of 5.00, indicating that students generally rated the instructional quality at FEBI as *good*. This overall score represents a consistently positive learning experience during the observed academic period and provides a descriptive baseline for subsequent clustering and regression analyses.

Two key insights emerge from the descriptive analysis:

1. Highest-Scoring Indicators: *Lecturer's Mastery of Material* and *Accuracy in Answering Questions* emerged as the strongest dimensions of instructional quality. Their high mean scores and positive response rates highlight lecturers' strong subject knowledge and effective academic communication.
2. Lowest-Scoring Indicator: *Material Suitability with the RPS (Syllabus)* was identified as the weakest indicator. While most of the students still perceived alignment between materials and the syllabus, the presence of neutral and negative responses suggests room for improvement in ensuring consistent conformity across courses.

Overall, these findings offer important empirical insights for institutional quality assurance. Strengths related to lecturer competence should be maintained, while targeted improvements are needed to enhance the alignment

between instructional materials and the RPS as part of continuous quality enhancement efforts.

Clustering and Regression Analysis

To identify patterns in student perceptions of learning quality, this study applied the K-Means clustering algorithm to the normalized dataset consisting of nine instructional quality indicators. For analytical consistency and interpretability, the optimal number of clusters was determined as two (k = 2) based on the Elbow Method and Silhouette Score. Initial centroids were generated using random initialization, and Euclidean distance was used to assign observations to the nearest centroid. The clustering process iteratively updated centroid positions based on the mean values of cluster members until convergence was achieved, indicated by stable centroid locations and cluster membership.

The clustering results indicate the presence of two distinct student perception groups. Cluster 1 comprises approximately 85% of the total respondents and is characterized by consistently high scores across most learning quality indicators. Students within this cluster predominantly expressed positive perceptions, particularly on indicators related to lecturer communication etiquette, adherence to lecture schedules, and conformity of assessment practices with the initial academic contract. In contrast, Cluster 2 accounts for approximately 15% of respondents and reflects a group with relatively lower scores on several indicators. This cluster is marked by higher proportions of neutral and negative responses, especially concerning the relevance of instructional materials to the Semester Learning Plan (RPS) and the transparency of assessment criteria.

Following the clustering analysis, multiple linear regression was conducted to examine the relationship between instructional quality indicators and overall student satisfaction. The regression model included nine independent variables representing learning quality dimensions and one dependent variable measuring global student satisfaction. The estimated regression equation is expressed as follows:

$$Y = 1.254 + 0.201X_1 + 0.387X_2 + 0.159X_3 + 0.172X_4 + 0.231X_5 + 0.195X_6 + 0.298X_7 + 0.183X_8 + 0.265X_9$$

where Ydenotes student satisfaction; X_1represents RPS delivery; X_2assessment transparency; X_3material suitability with the RPS; X_4relevance of examination questions; X_5lecturer mastery of material; X_6accuracy in answering questions; X_7Lecturer communication etiquette; X_8adherence to lecture schedules; and X_9conformity of assessment with the initial academic contract.

The regression model demonstrates strong explanatory power, with a coefficient of determination (R^2) of 0.85. This indicates that 85% of the variance in student satisfaction is explained by the nine instructional quality indicators included in the model. The remaining 15% of variance is attributable to factors not examined in this study. The overall model is statistically significant, as indicated by an F-statistic of 47.89 with a corresponding p-value of 0.000 (α = 0.05).

Individual t-test results show that all independent variables have statistically significant effects on student satisfaction, with p-values below 0.05. Among the predictors, assessment transparency ($\beta = 0.387$) exhibits the largest regression coefficient, while material suitability with the RPS ($\beta = 0.159$) shows the smallest, though still statistically significant, contribution to the model. These findings confirm that each instructional quality indicator independently contributes to explaining variations in student satisfaction.

Data Visualization

To complement the descriptive statistical analysis, data visualization was employed to present student perception patterns in a concise and interpretable visual format. The visualizations presented in this section—bar charts, pie charts, and heatmaps—are directly derived from the descriptive statistics reported in Table 1, ensuring full consistency between numerical and graphical representations.

Bar Chart

Data visualization techniques were used to complement the descriptive statistical analysis by presenting the results in a visual format that highlights distribution patterns and relative differences among learning quality indicators. The visualizations presented in this section are directly derived from the descriptive statistics summarized in the preceding table, ensuring consistency between numerical and graphical representations. Three visualization techniques were employed: bar charts, pie charts, and heatmaps.

Figure 1 illustrates the mean scores of the nine learning quality indicators. The results indicate a consistently high level of student evaluation, with mean scores ranging from 4.29 to 4.43 on a five-point Likert scale. The highest mean scores were observed for Lecturer's Mastery of Material and Accuracy in Answering Questions (both M = 4.43), highlighting strong lecturer competence and responsiveness in the learning process. Other indicators, such as Lecturer's Communication Etiquette (M = 4.38) and Conformity of Assessment with the Initial Academic Contract (M = 4.36), also demonstrate favorable evaluations. In contrast, Material Suitability with the RPS and Transparency of Assessment

Criteria recorded comparatively lower mean scores (both M = 4.29), although they remain within a positive evaluative range.

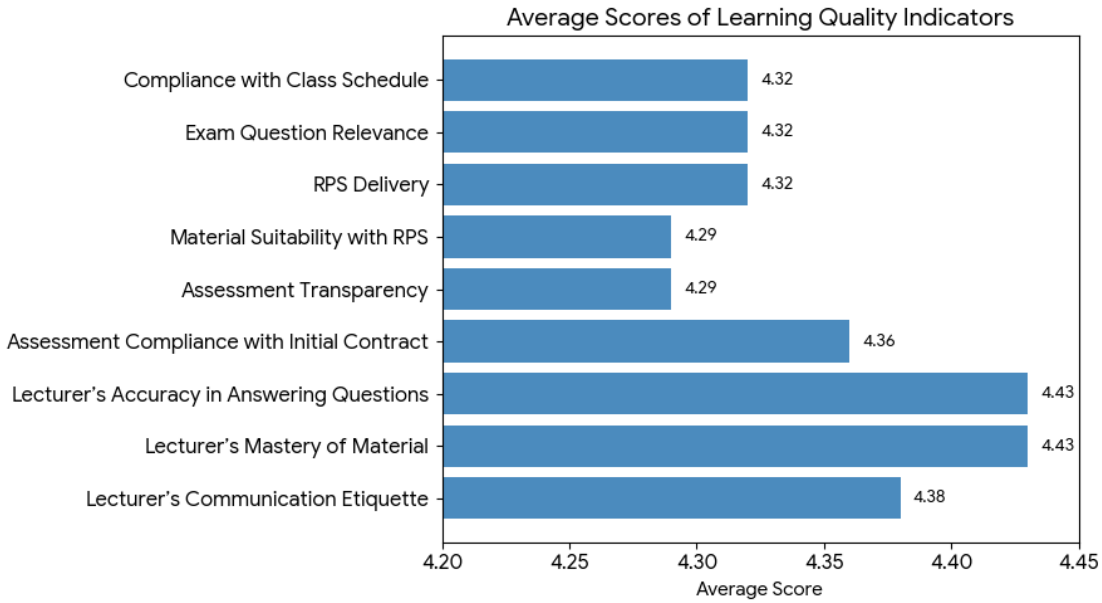

Figure 1. Bar Chart of Mean Scores for Learning Quality Indicators

Pie Chart

The pie chart summarizes the overall distribution of student responses based on aggregated Likert-scale categories derived from the same dataset reported in the descriptive table. Figure 2 presents the overall distribution of student responses based on aggregated Likert-scale categories. Positive responses (Agree and Strongly Agree) dominate the distribution, accounting for 94.2% of total responses, while neutral and negative responses represent 3.0% and 2.8%, respectively. This distribution reinforces the descriptive findings and confirms that favorable perceptions of instructional quality prevail across the evaluated indicators.

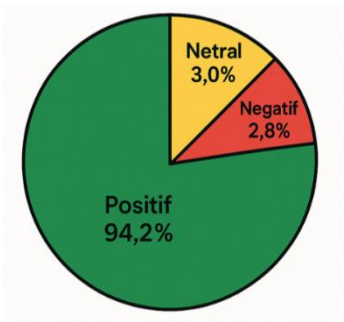

Figure 2. Pie Chart of Overall Student Response Distribution

Heatmap

The heatmap provides a visual representation of the same mean values reported in the descriptive statistics table, using color intensity to reflect score magnitude. Figure 3 provides a heatmap visualization of the mean scores for each learning quality indicator, using color intensity to represent score magnitude. Indicators with higher mean values—such as Lecturer's Mastery of Material and Accuracy in Answering Questions (M = 4.43)—exhibit stronger color intensity, reflecting their relative prominence in student evaluations. Conversely, Material Suitability with the RPS and Transparency of Assessment Criteria (both M = 4.29) appear with lighter intensity, consistent with their position as comparatively lower-rated indicators. Overall, the heatmap visually reinforces the patterns observed in the bar chart and descriptive statistics without introducing additional analytical interpretation.

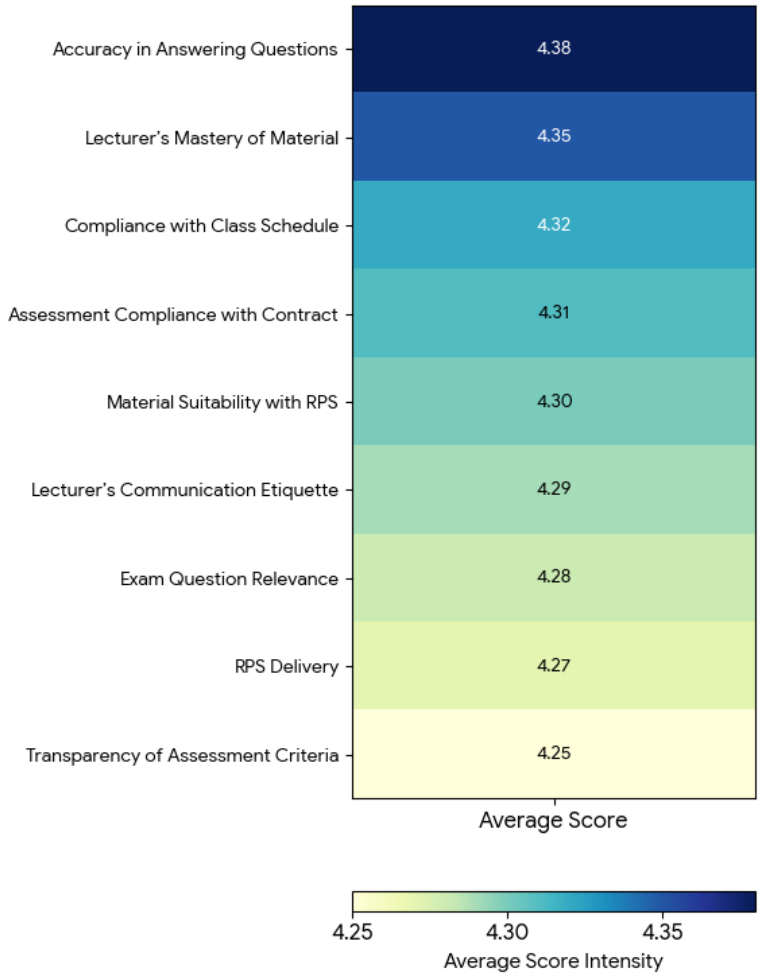

Figure 3. Heatmap of Learning Quality Indicator Scores

Discussion

Lecturer Competence as the Core Driver of Perceived Learning Quality

The findings indicate that lecturer-related competencies constitute the strongest contributors to students' perceptions of learning quality at FEBI IAIN Lhokseumawe. Indicators with the highest mean scores—namely Accuracy in Answering Questions and Lecturer's Mastery of Material—reflect students' strong confidence in lecturers' intellectual preparedness and pedagogical responsiveness. These results affirm that subject mastery is not merely a technical requirement, but an ethical *amānah* in Islamic education, where lecturers are entrusted to convey knowledge accurately and responsibly.

From a pedagogical perspective, strong material mastery enables lecturers to respond effectively to student inquiries, fostering meaningful academic interaction. Prior studies emphasize that lecturer expertise functions as a foundational prerequisite for effective instruction and positively mediates students' cognitive engagement and satisfaction (Schott & Marshall, 2020; Perez et al., 2023). In this context, FEBI lecturers' ability to demonstrate mastery and accuracy reinforces the credibility of instructional delivery and strengthens the perceived quality of the learning process.

Communication Etiquette and Institutional Consistency in Learning Delivery

Closely following lecturer competence, Communication Etiquette and Compliance with the Lecture Schedule emerged as prominent dimensions shaping positive student perceptions. High mean scores on these indicators suggest that respectful communication and punctuality are institutionalized practices within FEBI's academic culture. Professional and polite communication reflects the ethical principle of *iḥsān*, contributing to a psychologically safe and supportive learning environment.

Schedule compliance further reinforces institutional reliability and discipline. Consistent adherence to the academic timetable ensures predictability in learning activities, which supports students' time management and academic planning. Existing literature confirms that structured and predictable instructional environments enhance learning effectiveness and reduce cognitive uncertainty (McGaghie et al., 2009; Mohamed, 2024). Together, these findings indicate that FEBI has successfully integrated interpersonal ethics and organizational discipline into its instructional practices.

Assessment Fairness and Alignment with Academic Agreements

Assessment-related indicators, particularly Conformity of Assessment with the Initial Contract and Exam Question Relevance also demonstrated relatively high mean scores, signaling that students generally perceive

assessment practices as fair and aligned with prior agreements. This alignment is crucial for sustaining trust between students and lecturers, as it reflects procedural justice (*'adl*) within the academic process.

When assessments are perceived as consistent with stated learning objectives and initial agreements, students are more likely to accept evaluation outcomes as legitimate. Prior research highlights that fairness in assessment design and implementation significantly enhances students' satisfaction and reduces perceptions of bias (Cho et al., 2017). These findings suggest that FEBI has established a solid foundation in maintaining assessment integrity, although further refinement is still possible.

Curriculum Delivery and Transparency as Areas for Strategic Improvement

Despite the overall positive pattern, indicators related to Transparency of Assessment Criteria, RPS Delivery, and Material Suitability with the RPS recorded comparatively lower mean scores. Although these values remain within the "good" category, their relative position signals areas that require focused institutional attention. Limited clarity regarding assessment criteria may generate uncertainty among students, potentially diminishing their confidence in evaluation outcomes.

Similarly, perceived misalignment between delivered materials and the Semester Learning Plan (RPS) points to a gap between curricular design and instructional execution. Theoretically, such misalignment undermines curricular coherence and may weaken students' perception of instructional relevance (Stoian et al., 2022). Continuous curriculum monitoring and clearer communication of learning plans are therefore essential to ensure consistency between planned objectives and classroom practices (O'Neal et al., 2023).

Synthesis and Implications for Quality Enhancement

Taken together, the discussion reveals a structured hierarchy of determinants shaping student satisfaction at FEBI. Lecturer competence, communication quality, and institutional discipline function as primary strengths sustaining positive learning perceptions. However, achieving higher levels of learning satisfaction requires targeted improvements in assessment transparency and curriculum alignment.

Strategically, institutional efforts should prioritize strengthening transparency mechanisms, particularly through clearer assessment guidelines and improved dissemination of RPS information while maintaining existing strengths in lecturer professionalism and instructional discipline. Embedding the ethical principles of *amānah*, *iḥsān*, and *'adl* as operational standards will be

central to sustaining and enhancing educational quality within FEBI IAIN Lhokseumawe.

CONCLUSION

This study concludes that students generally perceive the quality of learning at the Faculty of Islamic Economics and Business (FEBI), IAIN Lhokseumawe, positively. The overall mean score of 4.32 out of 5.00 across nine instructional quality indicators indicates that the learning environment is considered conducive to academic engagement. This positive perception is primarily driven by lecturers' strong subject-matter competence and their responsiveness to student inquiries.

Lecturer's Mastery of Material and Accuracy in Answering Questions emerged as the highest-performing indicators, demonstrating that students place high value on intellectual preparedness and clear, timely academic communication. Within the context of Islamic higher education, these strengths reflect the practical enactment of the values of *amānah* (trustworthiness) and *iḥsān* (excellence) in teaching and scholarly practice.

Nevertheless, the study also identifies areas requiring strategic improvement. Material Suitability with the RPS (Syllabus) and Transparency of Assessment Criteria received comparatively lower mean scores, indicating inconsistencies in curriculum alignment and assessment clarity across certain courses. Although overall perceptions remain favourable, these gaps may reduce students' sense of academic certainty and fairness.

Accordingly, FEBI should prioritize strengthening instructional governance by ensuring consistent alignment between course materials and the RPS, as well as clearer communication of assessment standards. Enhancing transparency in evaluation processes reinforces the Islamic principle of *'adl* (justice) and fosters greater student trust. Sustaining lecturer competence while addressing these structural issues is essential for continuous quality improvement and for embedding Islamic ethical values as measurable dimensions of educational excellence.

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