

SUPPLEMENTARY MATERIALS

Digital Leadership, Artificial Intelligence Readiness and Teaching Innovation as Determinants of Academic Performance in Islamic Higher Education

Companion documentation to Nasiruddin & Nurhasanah (2026)

Document status: Article-grounded methodological supplement and proposed transparency materials. It is not a substitute for the original questionnaire, respondent-level dataset, or software outputs.

S1. Study overview and provenance

The published article reports a quantitative, cross-sectional explanatory survey of 250 undergraduate students (semester three or above) from private Islamic higher education institutions (PTKIS) in DKI Jakarta, selected using proportionate stratified random sampling. Four reflective constructs were measured with 18 five-point Likert items. Estimation used PLS-SEM with SEMinR in R and 1,000 bootstrap subsamples (article pp. 75–76).

Construct	Code	Items	Operational dimensions described in article
Digital Leadership	DL	4	Digital vision; support for technology-enhanced instruction; digital infrastructure; digital culture
AI Readiness	AIR / AI	5	Cognitive knowledge; practical ability; vision/awareness; ethical judgment
Teaching Innovation	TI	5	Student-centered methods; digital media; assessment variation; adaptive delivery; pedagogical experimentation
Academic Performance	APH / AP	4	Conceptual mastery; task completion quality; learning independence; perceived academic progress

S2. Construct operationalization and item blueprint

The article reports indicator codes and domain descriptions but does not reproduce the full original questionnaire wording. The following statements are PROPOSED reconstruction items for documentation and future replication; they must not be represented as the verbatim instrument administered to the 250 respondents.

Code	Domain (article-aligned)	Proposed item wording (not original)
DL1	Institutional digital vision	My institution communicates a clear vision for digital learning.
DL2	Instructional technology support	My institution supports lecturers in using technology for teaching.
DL3	Digital infrastructure	My institution provides digital infrastructure that supports learning.
DL4	Digital culture	My institution encourages a culture of responsible digital learning.
AI1	AI understanding	I understand the basic capabilities and limitations of AI tools.
AI2	Practical AI ability	I can use AI tools appropriately to support academic tasks.
AI3	AI awareness / vision	I can identify academic situations in which AI use is useful.
AI4	Evaluation of AI output	I critically check AI-generated information before using it.
AI5	Ethical AI judgment	I consider academic integrity and ethics when using AI.
TI1	Student-centered teaching	Lecturers use learning activities that actively involve students.
TI2	Digital media integration	Lecturers integrate digital media into classroom learning.
TI3	Assessment variation	Lecturers use varied assessment methods to evaluate learning.
TI4	Adaptive instruction	Lecturers adapt learning approaches to students' needs.
TI5	Pedagogical experimentation	Lecturers try new approaches to improve learning.
AP1	Conceptual mastery	I understand the key concepts taught in my courses.
AP2	Task quality	I complete academic assignments to a high standard.
AP3	Learning independence	I can learn and solve academic problems independently.
AP4	Perceived progress	My academic abilities have improved during my studies.

Suggested response anchors for a future replication: 1 = Strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly agree. The original article identifies a five-point scale but does not disclose verbatim questionnaire items.

S3. Structural hypotheses and path map

Hypothesis	Relationship	Expected sign	Reported conclusion
H1	DL → AIR	Positive	Supported
H2	DL → TI	Positive	Supported
H3	DL → APH	Positive	Supported
H4	AIR → APH	Positive	Not supported: significant negative sign
H5	TI → APH	Positive	Supported
H6	DL → AIR → APH	Mediation	Significant competitive mediation; opposite direction
H7	DL → TI → APH	Mediation	Positive indirect pathway; inferential qualification

Model structure: DL predicts AIR, TI, and APH; AIR and TI are parallel mediators predicting APH. This is an associational cross-sectional model, not evidence of temporal or causal ordering.

S4. Measurement model summary (published results)

Construct	Cronbach α	Composite reliability	AVE	Loading range
AIR	0.909	0.932	0.734	0.806–0.920
DL	0.900	0.931	0.772	0.798–0.959
TI	0.918	0.940	0.759	0.725–0.934
APH	0.889	0.923	0.751	0.833–0.917

Internal consistency and convergent validity thresholds were met, but discriminant validity was NOT established. Every Fornell–Larcker off-diagonal correlation exceeded the corresponding square root of AVE. HTMT values ranged from 1.038 to 1.105 (article p. 79).

S4.1 Discriminant validity: HTMT (published)

Pair	HTMT
AIR–DL	1.046
AIR–TI	1.089
AIR–APH	1.053
DL–TI	1.038
DL–APH	1.105
TI–APH	1.057

S5. Structural model and mediation results

Path	β	p-value	Interpretation
DL → AIR	0.957	< .001	Positive association
DL → TI	0.954	< .001	Positive association
DL → APH	0.904	< .001	Positive partial coefficient
AIR → APH	–0.957	< .001	Negative suppression- prone coefficient
TI → APH	1.048	< .001	Coefficient > 1; severe collinearity

Endogenous variable	R ²	Notable inner VIF
AIR	0.916	DL = 1.00 (single predictor)
TI	0.910	DL = 1.00 (single predictor)
APH	0.988	AIR = 114.01; TI = 106.52; DL = 11.93
Effect component	Estimate	Evidence status
DL → AIR → APH	−0.916	Bootstrapped indirect effect reported significant (p < .001)
DL → TI → APH	≈ 1.000	Point estimate reported; no bootstrap SD/t/p/CI in Table 9
DL → APH direct	0.904	Reported significant (p < .001)
DL → APH total	0.988	Arithmetic decomposition reported

The positive teaching-innovation indirect effect should not be described as independently bootstrap-confirmed on the basis of Table 9 alone, because its inferential statistics are not supplied there. The extreme VIFs and failed discriminant validity prevent robust substantive interpretation of the partial coefficients.

S6. Transparency and data-integrity checklist

- ☐ Archive the original Indonesian questionnaire and the English back-translation; distinguish them from the proposed items in S2.
- ☐ Provide a de-identified item-level dataset, codebook, and institution-stratum allocation where permitted by consent and governance.
- ☐ Audit raw item columns for duplication: the article flags identical distributions across AI5/DL2/TI1/TI4/TI5, AI4/DL3/TI3, and TI2/AP1.
- ☐ Re-estimate after data audit and disclose loadings, cross-loadings, HTMT confidence intervals, inner VIFs, and full bootstrap confidence intervals for BOTH indirect effects.
- ☐ Conduct a formal common-method-bias diagnostic and test a more discriminating measurement specification.
- ☐ Where feasible, replicate longitudinally and validate academic performance against objective records.

S7. Suggested follow-up robustness analyses (not performed in the article)

1. Compare the published four-construct specification with a re-specified measurement model following raw-data checks. 2. Evaluate separate ethical and operational AI-readiness dimensions. 3. Re-estimate models with non-overlapping indicators and report confidence intervals. 4. Test robustness across institution types or formal AI-policy groups if sample sizes permit. 5. Use temporally separated or objective academic-performance measures in future data collection. These are recommendations, not findings.

S8. Research ethics and reproducibility note

The article states that participation was voluntary and anonymous, electronic informed consent was obtained, and no personally identifying information was collected. It also reports translation/back-translation, expert content-validity review, and pilot testing. The supplementary package cannot verify these procedures without underlying records. No synthetic respondent observations, fabricated statistics, or fictitious ethical approvals are included.

S9. Source and scope

Primary source: Nasiruddin & Nurhasanah (2026). "Digital leadership, artificial intelligence readiness and teaching innovation as determinants of academic performance in Islamic higher education." *Qoumun: Journal of Social and Humanities*, 2(2), 73–92.

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Tables in S4–S5 reproduce numerical results from the article (especially Tables 3, 5, 6, 7, 8 and 9). S2 and S6–S7 are editorially prepared supplementary proposals, explicitly not original study instruments or newly observed evidence.