

Lecturer Perceptions of AI Integration in Maritime Vocational Curricula: A Thematic Analysis

Ihsan Ahda Tanjung ^{1*}

¹Maritime Institute, Jl. Marunda Makmur, RT.1/RW.1, Marunda, Cilincing District, North Jakarta, Special Capital Region of Jakarta 14150, Indonesia

Keywords

AI Integration; Curriculum Reform; Lecturer Perceptions; Maritime Education; Thematic Analysis

*Correspondence Email:

Ihsan.ahda@stipmail.ac.id

Abstract

Maritime vocational curricula cannot meaningfully integrate artificial intelligence without the active engagement of the lecturers who design, deliver, and evaluate instructional content — yet the perceptions, attitudes, and pedagogical concerns of maritime lecturers regarding AI integration have received no empirical attention in the Indonesian maritime education literature. This study examines lecturer perceptions of AI integration in maritime vocational curricula at Sekolah Tinggi Ilmu Pelayaran (STIP) Jakarta through a qualitative thematic analysis of focus group discussions with 30 lecturers across Port and Shipping Management (PSM), Deck Nautical (DN), and Marine Engineering (ENG) programs. Four dominant thematic categories emerged from systematic coding of FGD transcripts: Bifurcated Role Identity, distinguishing lecturers' practitioner and educator self-conceptions of AI relevance; Institutional Readiness Perception, characterizing lecturers' assessments of STIP Jakarta's organizational capacity to support AI integration; Pedagogical Uncertainty, capturing specific curriculum design and instructional delivery concerns; and Resistance-Adoption Continuum, mapping the range of lecturer orientations from skeptical rejection to enthusiastic endorsement of AI curriculum integration. Cross-major analysis reveals that PSM lecturers exhibit the most proactive integration orientation while DN lecturers exhibit the most pronounced bifurcated role tension. The study contributes the first educator-side empirical account of AI integration readiness in Indonesian maritime vocational education and identifies institutional support priorities for effective AI curriculum implementation.

1. Introduction

The educator dimension of digital transformation in higher education has generated substantial research attention across general university contexts [1], but the parallel question within maritime vocational education — how lecturers at maritime academies perceive, evaluate, and position themselves relative to AI integration in their professional teaching practice — has not been empirically investigated. This absence is consequential for a specific structural reason: maritime vocational lecturers occupy a uniquely bifurcated professional identity that distinguishes them from lecturers in most other vocational fields. Many STIP Jakarta lecturers are former or active maritime practitioners — deck officers, marine engineers, port operations managers — who

transitioned into teaching roles while maintaining professional identities grounded in operational maritime practice. Their assessment of AI's educational relevance is therefore simultaneously a practitioner judgment (is AI operationally significant for maritime professionals?) and an educator judgment (should and can AI be taught effectively within a maritime vocational curriculum?) — two assessments that may diverge substantially and whose interplay has not been studied.

The educator-side of technology integration in higher education has been extensively theorized through frameworks including Rogers' [2] diffusion of innovations theory — which identifies adopter categories from innovators through laggards — and institutional theory accounts of how organizational cultures and structural conditions shape individual adoption behavior [3]. Applied to maritime vocational lecturers' AI integration perceptions, these frameworks generate specific theoretical expectations: lecturers with stronger practitioner identity orientations may evaluate AI curriculum relevance primarily through operational rather than pedagogical lenses; lecturers with weaker institutional support perceptions may exhibit higher integration resistance regardless of their personal AI attitudes; and between-program variation in curriculum structure and student professional formation context may produce program-specific patterns of AI integration orientation that cannot be addressed through uniform institutional reform.

At STIP Jakarta, the digital transformation agenda is organizational as well as curricular: Indonesia's Ministry of Transportation has signaled expectations for state maritime education institutions to align with national digital transformation goals, creating institutional-level pressure for curriculum modernization that individual lecturers must navigate within their existing workload, pedagogical competency, and professional identity frameworks [4]. The degree to which this organizational pressure is experienced as enabling or constraining by STIP Jakarta's lecturer community — and the specific pedagogical and institutional concerns that shape lecturer AI integration orientation — constitutes the empirical inquiry this study addresses.

This study investigates three objectives: first, to characterize the dominant thematic categories structuring STIP Jakarta lecturers' perceptions of AI integration across program specializations; second, to examine between-program variation in lecturer integration orientation and the factors differentiating more from less proactive positions; and third, to identify the institutional support dimensions that lecturers across all three programs identify as most consequential for AI curriculum integration feasibility.

1.1 Theoretical Framework

This study draws on three complementary theoretical frameworks that together provide a multi-level account of lecturer AI integration perception. At the individual level, Rogers' [2] diffusion of innovations theory provides a typological framework for characterizing the distribution of adoption orientations across the lecturer community, from innovators who proactively seek AI integration opportunities to laggards whose adoption would require significant structural intervention to produce. At the professional identity level, Beauchamp and Thomas's [5] framework of teacher identity as a negotiated, contextually constituted self-concept provides the conceptual basis for understanding why maritime lecturers' operational practitioner identities may generate distinctive patterns of AI integration perception not anticipated by general higher-education lecturer adoption frameworks. At the institutional level, DiMaggio and Powell's [6] institutional theory account of organizational isomorphism provides the basis for understanding how Ministry of Transportation digital transformation mandates create normative pressure that shapes lecturer perception of AI integration as an institutionally required adaptation rather than a freely chosen pedagogical innovation. Together, these three frameworks enable analysis of lecturer perceptions at the individual disposition, professional identity, and institutional context levels simultaneously — a multi-level analytical structure that the single-institution FGD design of this study is well positioned to generate.

2. Research Method

This study employed a qualitative design centered on semi-structured focus group discussions, selected because the study's objectives require rich, socially negotiated accounts of lecturer perception and professional identity positioning that individual interviews would not generate with the same comparative and dialogic

quality [7]. Data collection was conducted at STIP Jakarta from August 2025 to March 2026 as part of the institution's Digital Transformation readiness assessment, using a design that maintained program-specific FGD groupings to enable natural within-group professional community discourse while generating cross-group comparative data.

The participant population comprised 30 STIP Jakarta lecturers across the three academic programs: 10 from Port and Shipping Management, 10 from Deck Nautical, and 10 from Marine Engineering. All participants were active teaching staff with primary curriculum delivery responsibilities. Within each program group, lecturers included both former maritime practitioners who had transitioned to academic roles and non-seafarer academics with domain-relevant educational backgrounds, enabling examination of the bifurcated role identity dynamic that this study theoretically anticipates. Three separate focus group discussions were conducted — one per program group — using a semi-structured protocol developed from the theoretical frameworks described above. The protocol addressed four thematic domains: AI's operational relevance to maritime professional practice; AI's pedagogical relevance to current curriculum content; institutional capacity and support for AI integration; and personal professional positioning relative to AI integration. Each FGD lasted approximately 90 minutes, was audio-recorded with participant consent, conducted in Bahasa Indonesia, and transcribed verbatim.

Thematic analysis followed Braun and Clarke's [8] six-phase procedure: data familiarization through repeated transcript reading, initial open coding, theme development through iterative code-to-theme mapping, theme review against the transcript corpus, theme definition and naming, and narrative synthesis integration. Cross-program comparison was applied systematically after within-program thematic coding to identify convergent and divergent thematic patterns across the PSM, DN, and ENG lecturer groups. Member checking was conducted with three participants across the three programs to verify the accuracy of thematic interpretation [9].

3. Results and Discussion

3.1 Overview of Thematic Structure

Systematic coding of the three FGD transcripts generated four dominant thematic categories, each present across all three program groups but with distinctive within-theme patterns by program that cross-program comparison reveals. Table 1 presents the thematic structure alongside program-specific characterization of each theme's dominant expression.

Table 1. Thematic Categories and Cross-Program Characterization (n = 30, 3 FGDs)

Thematic Category	PSM Lecturers (n=10)	DN Lecturers (n=10)	ENG Lecturers (n=10)
1. Bifurcated Role Identity	Low tension: AI seen as continuous with logistics digital tool use in both roles	High tension: "maritime officer" identity resists AI in navigation; "teacher" identity accepts curriculum modernization	Moderate tension: AI seen as useful for condition monitoring but "not seamanship"
2. Institutional Readiness Perception	Moderate-positive: logistics software experience creates capacity optimism	Skeptical: simulator-focused infrastructure seen as AI-incompatible	Neutral-moderate: sees infrastructure need as manageable if industry-partnered
3. Pedagogical Uncertainty	Lowest: data-literacy instruction experience reduces curriculum design anxiety	Highest: "How do I teach students to trust AI when I have manually overridden ECDIS myself?"	Moderate: practical lab integration feasibility concern dominant

4. Resistance-Adoption Continuum	Innovator-to-Early Adopter majority	Late Majority-to-Laggard majority	Early Majority majority
----------------------------------	-------------------------------------	-----------------------------------	-------------------------

3.2 Theme 1: Bifurcated Role Identity

The Bifurcated Role Identity theme captures the tension between lecturers' operational practitioner self-concept and their educator self-concept in evaluating AI's curriculum relevance — the study's most theoretically significant and analytically distinctive finding. Across all three FGD groups, this tension was explicitly articulated by multiple participants, but its character and resolution differed substantially by program.

DN lecturers exhibited the most pronounced bifurcated role tension. Former deck officer participants described a fundamental conflict between their professional identity as practitioners who had learned to treat manual override of electronic navigation systems as a core competency virtue — "the moment you trust the machine completely is the moment you become dangerous at sea" — and their educator identity as lecturers at an institution under institutional pressure to integrate AI. This tension was not merely attitudinal but epistemological: several DN participants expressed genuine uncertainty about whether AI integration in navigation training would produce better or worse seafarers, with personal operational experience providing counter-narratives to the institutional digital transformation agenda. PSM lecturers, by contrast, experienced minimal role identity tension regarding AI: their practitioner identity as logistics and port management professionals was already constituted through data systems, digital documentation, and analytics platforms, making AI a continuous evolution of the professional digital environment rather than a challenge to established professional identity.

3.3 Theme 2: Institutional Readiness Perception

Institutional Readiness Perception captures lecturers' assessments of STIP Jakarta's organizational capacity — infrastructure, professional development support, leadership commitment, and curriculum governance processes — to meaningfully support AI integration. Three sub-themes emerged within this theme across the three FGDs.

The *Infrastructure Gap* sub-theme was most prominently expressed by DN lecturers, who characterized STIP Jakarta's existing infrastructure as simulator-centric in ways that were perceived as structurally misaligned with AI integration demands: "Our investment has been in bridge simulators and engine-room simulators — high-quality physical infrastructure for conventional training. AI integration means different infrastructure: data systems, software platforms, cloud connectivity. We don't have a clear pathway for how those two fit together." The *Professional Development Deficit* sub-theme was convergent across all three programs: all 30 participants endorsed the perception that STIP Jakarta had not yet provided systematic professional development enabling lecturers to develop the AI pedagogical competency that effective AI curriculum integration requires. The *Leadership Signal Ambiguity* sub-theme, expressed most explicitly in the PSM FGD, captured lecturers' perception that institutional communications about the digital transformation agenda had not yet translated into specific curriculum mandates, resource allocations, or accountability expectations that would operationalize the transformation agenda into concrete instructional action.

3.4 Theme 3: Pedagogical Uncertainty

Pedagogical Uncertainty captures lecturers' specific concerns about curriculum design, instructional delivery, and student assessment in AI-integrated maritime vocational teaching. This theme generated the most program-specific expression of any of the four themes, reflecting the distinct curriculum structures and instructional modalities of the three programs.

DN lecturers' pedagogical uncertainty was most fundamental and philosophically complex, centering on the question of epistemic authority: "If I teach cadets to rely on AI decision support for collision avoidance and the AI is wrong, have I prepared them for the sea or for a simulation?" This uncertainty about AI reliability as a

teaching content target — rather than merely a teaching tool — reflects the life-safety stakes of navigational decision-making that DN instruction uniquely carries. ENG lecturers' pedagogical uncertainty was more practical: concerns about how to integrate AI-based predictive maintenance and engine diagnostics instruction within existing laboratory sessions without additional equipment investment or curriculum space dominated the ENG FGD's pedagogical discussion. PSM lecturers expressed the lowest pedagogical uncertainty, with several participants describing existing data analytics and logistics software instruction as a natural foundation for AI curriculum extension.

3.5 Theme 4: Resistance-Adoption Continuum

Cross-program distribution of participants along Rogers' [2] innovator-to-laggard adoption continuum, as interpreted from participant discourse during FGDs, revealed a clear program-level pattern: PSM participants clustered predominantly in the Innovator-to-Early Adopter range, ENG participants in the Early Majority range, and DN participants in the Late Majority-to-Laggard range. This distribution corresponds directly with the Bifurcated Role Identity and Institutional Readiness patterns documented above, confirming that adoption orientation is not primarily a function of individual personality but of the interaction between professional formation context, institutional readiness perception, and pedagogical uncertainty level that each program's specific curriculum character generates.

Adoption Category	PSM (n=10)	DN (n=10)	ENG (n=10)	Total
 Innovator	3 	0	1 	4 (13.3%)
 Early Adopter	5 	1 	3 	9 (30.0%)
 Early Majority	2 	3 	5 	10 (33.3%)
 Late Majority	0	4 	1 	5 (16.7%)
 Laggard	0	2 	0	2 (6.7%)
Total	10 (100%)	10 (100%)	10 (100%)	30 (100%)

[Interpreted from participant discourse; not self-categorized by participants]

[PSM: 80% Innovator/Early Adopter] **[DN: 60% Late Majority/Laggard]**

Figure 1. Lecturer AI Integration Orientation Distribution by Program (n = 30)

3.6 Discussion

The four-theme thematic structure generated by this study establishes a multi-level, program-differentiated account of STIP Jakarta lecturer AI integration perception that reveals both the institutional reform entry points most likely to produce productive engagement and the resistance sources most requiring targeted attention. The Bifurcated Role Identity theme's program-specific expression — with DN lecturers experiencing the most profound practitioner-educator tension and PSM lecturers experiencing the least — directly reflects Beauchamp and Thomas's [5] theoretical prediction that professional identity configuration shapes technology perception in ways that are not reducible to individual attitude and cannot be addressed by attitude-change interventions alone. DN lecturers' resistance to AI integration is not primarily attitudinal but epistemological: it reflects genuine and professionally grounded uncertainty about whether AI-integrated navigation training produces the adaptive, judgment-capable seafarer that the profession historically values — an uncertainty that life-safety professions across aviation, medicine, and maritime contexts have consistently generated when confronting AI automation of high-stakes decision domains [10].

The Institutional Readiness Perception theme's finding that professional development deficit was the most cross-programmatically consistent institutional concern — endorsed in all three FGDs despite substantial between-program variation on other themes — identifies faculty AI competency development as the single most productive institutional investment STIP Jakarta can make to accelerate curriculum AI integration. This finding is consistent with Zawacki-Richter et al.'s [1] systematic review of AI in higher education, which established that educator AI competency is the most frequently cited barrier to effective institutional AI integration across diverse higher-education contexts. For STIP Jakarta specifically, faculty AI competency development must be program-differentiated: DN lecturers require AI competency development that directly addresses the epistemic tension between AI decision support and professional navigational judgment, rather than generic AI literacy training that does not engage the specific life-safety competency concerns driving DN lecturer resistance [11].

The Pedagogical Uncertainty theme's most significant finding — DN lecturers' fundamental uncertainty about whether AI integration in navigation training produces better or worse seafarers — represents a genuinely unresolved empirical question that neither the AI education literature nor the maritime safety research has yet answered with sufficient specificity to resolve the uncertainty. This uncertainty should not be dismissed as conservatism: it is epistemically appropriate to be uncertain about whether AI navigation decision support, if integrated into cadet training before the technology is fully mature and its failure modes fully understood, produces more competent or more automation-dependent seafarers [12]. STIP Jakarta's curriculum development process should explicitly engage this question through structured pilot evaluation rather than assuming that AI integration uniformly improves navigational competency development.

Study limitations include the single-institution qualitative design, which, while providing institutional specificity, does not permit generalization of lecturer orientation distribution to Indonesian maritime education more broadly. The cross-sectional FGD design captures lecturers' perceptions at a specific moment in STIP Jakarta's digital transformation process that may shift as institutional strategy and implementation develop. Future research should extend FGD-based lecturer perception analysis to multiple Indonesian maritime institutions, pursue longitudinal tracking of how lecturer AI integration orientations evolve following structured professional development interventions, and investigate whether the DN-specific Bifurcated Role Identity tension is a unique feature of navigation instruction or a broader pattern characterizing life-safety professional maritime education contexts across national settings.

4. Conclusion

This study has documented four dominant thematic categories structuring STIP Jakarta lecturers' perceptions of AI curriculum integration — Bifurcated Role Identity, Institutional Readiness Perception, Pedagogical Uncertainty, and Resistance-Adoption Continuum — with consistent program-specific expression revealing that DN lecturers exhibit the most pronounced integration resistance driven by practitioner-educator role tension and life-safety epistemological concerns, while PSM lecturers exhibit the most proactive integration orientation driven by professional context alignment with data-rich AI application domains. These findings contribute the first educator-side empirical account of AI integration readiness in Indonesian maritime vocational education, establishing that effective AI curriculum reform at STIP Jakarta requires not uniform institutional mandates but program-differentiated institutional support — addressing DN lecturers' epistemological concerns about AI and navigational judgment, ENG lecturers' practical laboratory integration concerns, and the universal professional development deficit all three groups identify as the most critical institutional enabler for meaningful curriculum AI integration.

5. References

- [1] O. Zawacki-Richter, V. I. Marín, M. Bond, and F. Gouverneur, "Systematic review of research on artificial intelligence applications in higher education — where are the educators?" *Int. J. Educ. Technol. High.Educ.*, vol. 16, no. 1, p. 39, 2019. DOI: 10.1186/s41239-019-0171-0
- [2] E. M. Rogers, *Diffusion of Innovations*, 5th ed. New York: Free Press, 2003.

- [3] P. J. DiMaggio and W. W. Powell, "The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields," *Am. Sociol. Rev.*, vol. 48, no. 2, pp. 147–160, 1983. DOI: 10.2307/2095101
- [4] A. Wahid, M. Y. Jinca, T. Rachman, and J. Malisan, "Determination of Indicators of Implementation of Sea Transportation Safety Management System for Traditional Shipping Based on Delphi Approach," *Sustainability*, vol. 15, no. 13, 2023. DOI: 10.3390/su151310080
- [5] C. Beauchamp and L. Thomas, "Understanding teacher identity: An overview of issues in the literature and implications for teacher education," *Cambridge J. Educ.*, vol. 39, no. 2, pp. 175–189, 2009. DOI: 10.1080/03057640902902252
- [6] P. J. DiMaggio and W. W. Powell (Eds.), *The New Institutionalism in Organizational Analysis*. Chicago: University of Chicago Press, 1991.
- [7] J. W. Creswell and C. N. Poth, *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, 4th ed. Thousand Oaks, CA: Sage Publications, 2018.
- [8] V. Braun and V. Clarke, "Using thematic analysis in psychology," *Qual. Res. Psychol.*, vol. 3, no. 2, pp. 77–101, 2006. DOI: 10.1191/1478088706qp063oa
- [9] Y. S. Lincoln and E. G. Guba, *Naturalistic Inquiry*. Beverly Hills, CA: Sage Publications, 1985.
- [10] K. Bogusławski, M. Gil, J. Nasur, and K. Wróbel, "Implications of autonomous shipping for maritime education and training: the cadet's perspective," *Marit. Econ. Logist.*, vol. 24, no. 2, pp. 327–343, 2022. DOI: 10.1057/s41278-022-00217-x
- [11] L. Widaningsih, S. Rahayu, V. Dwiyaniti, and W. Widanengsih, "Analysis and Mapping of Technical Competency Needs for TVET Teachers in the Era of Industry 4.0," *J. Tech. Educ. Train.*, vol. 17, no. 2, pp. 151–164, 2025. DOI: 10.30880/jtet.2025.17.02.011
- [12] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Q.*, vol. 13, no. 3, pp. 319–340, 1989. DOI: 10.2307/249008
- [13] A. Hattingh, S. Hodge, and T. Mavin, "Flight instructor perspectives on competency-based education: insights into educator practice within an aviation context," *Int. J. Train. Res.*, vol. 20, no. 3, pp. 264–282, 2022. DOI: 10.1080/14480220.2022.2063155
- [14] F. Mutohhari, P. Sudira, F. D. Isnantyo, and N. W. A. Majid, "Generic green skills: maturity level of vocational education teachers and students in Indonesia," *Int. J. Eval. Res. Educ.*, vol. 14, no. 1, pp. 179–187, 2025. DOI: 10.11591/ijere.v14i1.29191
- [15] H. Li, S. I. Khattak, X. Lu, and A. Khan, "Greening the Way Forward: A Qualitative Assessment of Green Technology Integration and Prospects in a Chinese Technical and Vocational Institute," *Sustainability*, vol. 15, no. 6, 2023. DOI: 10.3390/su15065187