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Digital Transformation in Indonesian Maritime Education: A Qualitative Study on Technology-Enhanced Learning

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Abstract

This research critically examines the integration of digital technologies in maritime education at Sekolah Tinggi Ilmu Pelayaran (STIP) Indonesia and its impact on graduate competency development. Through a qualitative approach involving in-depth interviews with graduates, educators, and industry stakeholders, along with document analysis, the study reveals a significant "pedgagogy-technology gap." While STIP Indonesia has successfully established robust digital infrastructure, including advanced simulators, findings indicate that technological access alone is insufficient for developing comprehensive maritime competencies. The research identifies three critical barriers: constrained access to digital resources, misalignment between technology use and pedagogical approaches, and varying levels of instructor digital proficiency. These factors collectively limit the development of higher-order digital fluency and analytical mindset needed in modern maritime operations. The study contributes to maritime education literature by demonstrating that effective digital transformation requires parallel investments in curriculum redesign, faculty development, and pedagogical innovation alongside technological infrastructure. Practical implications suggest strategic rebalancing of resources and enhanced industry-academia collaboration to bridge the competency gap and strengthen Indonesia's maritime workforce readiness in the era of Industry 4.0.

Keywords:

Digital Transformation, Maritime Education, Technology-Enhanced Learning, Competency Development, Pedagogy-Technology GAP

INTRODUCTION

The relentless tide of digitalization is fundamentally reshaping the global maritime industry, a sector traditionally characterized by its deep-seated conventions and gradual adoption of change. From the integration of Artificial Intelligence (AI) in navigation to the deployment of Internet of Things (IoT) sensors for predictive maintenance and the exploration of autonomous vessels, the very fabric of maritime operations is being rewoven with digital threads [1]. This technological surge, often termed 'Maritime 4.0', promises unprecedented gains in efficiency, safety, and environmental sustainability. However, this transformation hinges not merely on the sophistication of hardware and software but on the human element—the competence and readiness of the maritime workforce to navigate this new digital seascape. The International Maritime Organization (IMO) and industry stakeholders increasingly recognize that the success of technological mandates, from the

Energy Efficiency Existing Ship Index (EEXI) to enhanced cyber-risk management, is ultimately dependent on a digitally literate and adaptable human operator [1]. It is within this crucible of technological imperative and human capability that the context of maritime education and training (MET) emerges as a critical, and arguably the most vulnerable, nexus. Nowhere is this challenge more acute than in archipelagic nations like Indonesia, whose economic vitality and social cohesion are inextricably linked to the efficacy of its maritime sector. The digital competence of graduates from institutions such as the Sekolah Tinggi Ilmu Pelayaran (STIP) Indonesia is not merely an academic concern; it is a strategic determinant of national competitiveness, port management efficacy, and sustainable maritime economic development [2].

The existing body of knowledge presents a complex picture. On one hand, numerous studies extol the virtues of simulation-based training, e-learning platforms, and other digital tools in MET. Research indicates that well-implemented simulator training can significantly enhance the development of non-technical skills like decision-making and resource management, which are crucial for safe ship operations [3]. Furthermore, the IMO's Standards of Training, Certification and Watchkeeping (STCW) Convention has progressively incorporated guidelines for the use of simulators, legitimizing their role in competency assessment. However, a significant gap persists between the availability of technology and its effective integration into a pedagogically sound curriculum. Many MET institutions, particularly in developing economies, face what can be termed the "technology-pedagogy mismatch," where investments in advanced hardware outpace the development of instructional methodologies and faculty capacity to leverage these tools for deep, conceptual learning [1]. The literature on maritime education often focuses on the technical specifications of techno-pedagogical tools or on broad policy recommendations, leaving a relative scarcity of in-depth, qualitative inquiry into the lived experiences, perceptions, and adaptation challenges of the key stakeholders themselves: the students, the alumni, and the educators [4]. We know much about what technologies are being purchased, but less about how they are being used, experienced, and translated into tangible competency within the unique socio-cultural and operational context of Indonesian maritime operations.

This disconnect forms the core of the research problem this study seeks to address: a critical understanding of the perceived effectiveness, implementation challenges, and ultimate impact of digital technology and learning innovations on the development of STCW-compliant competencies and career readiness among graduates of STIP Indonesia. The central research question is therefore: How do stakeholders within the STIP Indonesia ecosystem—alumni, educators, and industry representatives—perceive and experience the integration of digital technologies in maritime education, and what is its perceived influence on competency development and professional adaptation? This central question branches into several specific objectives: first, to document and analyze the types and extent of digital learning technologies currently deployed at STIP Indonesia; second, to explore the pedagogical approaches employed alongside these technologies; third, to assess, from the stakeholders' perspectives, the alignment between digitally-acquired competencies and the actual demands of the modern, digitalized maritime workplace; and fourth, to identify the systemic, infrastructural, and cultural barriers that hinder the optimal integration of technology-enhanced learning.

The rationale for this research is multi-faceted and deeply urgent. From an economic management perspective, Indonesia's vision as a "Global Maritime Fulcrum" is contingent upon a highly skilled maritime workforce capable of operating and managing increasingly complex and efficient port and shipping systems. Inefficiencies stemming from a skills gap directly translate into economic losses through port congestion, suboptimal vessel utilization, and increased operational risks [2]. From a social development standpoint, the welfare and career trajectories of thousands of Indonesian seafarers are at stake. The transition to digitalized ships can be a source of anxiety and de-skilling if seafarers are not adequately prepared, potentially leading to increased stress, mental health challenges, and job displacement—issues that the Maritime Labour Convention [3] seeks to mitigate. Conversely, effective digital training can empower seafarers, enhancing their safety, employability, and career progression in a competitive global labor market. Understanding how MET institutions like STIP Indonesia are navigating this transition is therefore crucial for formulating policies that promote both economic efficiency and social equity within the maritime sector.

Methodologically, this study is grounded in a qualitative research paradigm, chosen for its ability to provide rich, contextual, and nuanced insights into complex social phenomena. A purely quantitative approach, while useful for measuring correlations, would fail to capture the depth of

stakeholder experiences, the subtleties of institutional challenges, and the underlying reasons behind certain perceptions. Therefore, this research will employ a multi-method qualitative design involving in-depth, semi-structured interviews with a purposively selected sample of STIP Indonesia alumni from recent cohorts (Batch 61-63), seasoned educators, and industry representatives from major Indonesian shipping and port companies. This will be complemented by focus group discussions to foster interactive dialogue and uncover collective perspectives, and document analysis of relevant curriculum materials and institutional reports. The data collected will be subjected to a rigorous thematic analysis, using NVivo software to facilitate the coding process and identify emergent patterns, themes, and contradictions across the different stakeholder groups. This methodology is designed not to generate statistically generalizable findings, but to develop a comprehensive, empirically grounded narrative that illuminates the realities of digital transformation in Indonesian MET, providing a foundation for informed institutional strategy and future quantitative validation.

In conclusion, this research positions itself at the intersection of maritime economics, educational policy, and social management. By critically examining the digital transition within STIP Indonesia through the voices of those directly involved, it aims to contribute a vital, context-rich perspective to the global discourse on maritime human resource development. The findings are expected to yield actionable insights for MET institutions in Indonesia and similar contexts, guide industry-institution collaboration, and inform national policy to ensure that the Indonesian maritime workforce is not merely a passenger but a proactive navigator in the voyage toward a digital and sustainable maritime future.

METHOD

This study employs a qualitative research approach to develop a comprehensive, nuanced understanding of the integration of digital technologies in maritime education at STIP Indonesia and its perceived impact on graduate competencies. The qualitative paradigm is chosen for its capacity to explore complex social phenomena in depth, capturing the subjective experiences, beliefs, and perspectives of key stakeholders, which are essential for answering the "how" and "why" behind the research problem [5]. This is not a study seeking statistical generalization, but rather an inquiry aimed at generating rich, contextual insights that can inform policy and practice within the specific ecosystem of Indonesian maritime education and its connection to the broader maritime economy.

The population of interest encompasses all individuals directly involved in or affected by the digital transformation at STIP Indonesia. To capture a holistic perspective, a purposive sampling strategy was employed to select participants from three distinct but interconnected groups. The first sample group consists of 15 graduates from the cohorts of 2022, 2023, and 2024 (Batch 61, 62, and 63). These alumni are the primary beneficiaries and products of the educational process; their lived experiences in transitioning from the academic environment to the professional maritime workplace provide irreplaceable data on the practical applicability and perceived gaps in their digitally-acquired competencies. The second sample group includes 10 senior lecturers and administrative leaders from STIP Indonesia. Their selection is crucial as they are the architects and implementers of the curriculum; their insights reveal the institutional challenges, pedagogical strategies, and resource constraints involved in integrating technology into teaching and learning. The third group comprises 5 industry representatives from national shipping companies and port operators. Their inclusion is urgent as they are the ultimate consumers of the graduates' skills; their perspectives on the alignment between educational output and industry needs in the era of Maritime 4.0 are critical for assessing the external validity and economic relevance of the education provided (Paridaens & Notteboom, 2021). This multi-stakeholder sampling ensures data triangulation, allowing the research to build a robust narrative from multiple angles of the same phenomenon.

The primary research instrument is a suite of semi-structured interview protocols, meticulously designed for each stakeholder group. The protocols are structured around core thematic areas corresponding to the study's variables. The independent variables—Digital Technology Integration (e.g., access to and use of simulators, e-learning platforms) and Learning Innovation (e.g., pedagogical approaches using technology)—are explored through indicators such as frequency of technology use, diversity of digital tools in the curriculum, and pedagogical methods employed. The dependent variables—STCW-Compliant Competency Development and Career Readiness—are investigated through indicators like perceived proficiency in operating digital navigation systems, confidence in troubleshooting, speed of adaptation onboard modern vessels, and career progression. Supporting instruments include a focus group discussion guide for the alumni to foster dynamic

interaction and collective sense-making, and a document analysis framework to systematically review official curriculum documents, training module, and institutional reports to corroborate the interview data. This multi-instrument approach ensures a comprehensive capture of both explicit policies and implicit lived experiences.

The data collection process is conducted in critical, sequential phases. Initially, in-depth interviews are held with each of the 30 participants, either in person or via secure digital platforms, with each session audio-recorded and transcribed verbatim. This phase is followed by three separate focus group discussions with the alumni cohorts to delve deeper into shared experiences and divergent views. Concurrently, document analysis of the STIP Indonesia curriculum and training reports is conducted to provide contextual and corroborative evidence. The rigorous application of these instruments is vital; it allows for the collection of not just surface-level opinions but deep-seated perceptions and contextual factors that influence the effectiveness of digital pedagogy. The process is designed to be iterative, with preliminary findings from early interviews informing the probing questions in subsequent ones, thereby enriching the data density.

For data analysis, a systematic thematic analysis approach, guided by the framework of Braun and Clarke, is adopted. The first step involves a meticulous process of familiarization and initial coding of the transcribed interviews, focus group notes, and document excerpts [5]. These codes are then categorized into emerging themes, such as "the simulation-practice gap," "infrastructure versus pedagogy," and "industry-academia disconnect." Following this, a cross-group comparison is undertaken to identify commonalities and distinctions between the perspectives of alumni, educators, and industry professionals. For instance, the theme of "competency readiness" is examined across all three groups to see where perceptions align or diverge. Finally, a narrative synthesis is woven together, integrating the thematic findings and cross-group comparisons into a cohesive, critical narrative. This narrative does not merely report findings but interprets them to explain the complex interplay between technology, pedagogy, institutional policy, and market demands, ultimately painting a holistic picture of the challenges and opportunities in forging a digitally competent Indonesian maritime workforce for sustainable economic development.

RESULTS AND DISCUSSION

Results and Analysis

The qualitative data collected from in-depth interviews, focus group discussions, and document analysis revealed a complex and multifaceted picture of digital transformation at STIP Indonesia. While stakeholders acknowledged significant progress and overall effectiveness in certain domains, the analysis uncovered critical nuances and persistent gaps that define the current state of technology-enhanced maritime education. The findings are structured around the core research indicators, presenting a thematic analysis supported by comprehensive data tables that synthesize the perspectives of graduates, educators, and industry partners.

Table 1. Summary of Research Findings on IoT/AI Competency Development

Indicator	Graduate Perspective	Educator Perspective	Industry Perspective	Composite Analysis & Score
1. Access to Digital Tools	High exposure to full-mission bridge simulators and ECDIS trainers. Consistent mention of limited access time due to high student-to-simulator ratio.	Confirmed availability of "world-class" simulator hardware. Expressed frustration over scheduling constraints and maintenance downtime.	Aware of STIP's simulator facilities through industry days. Generally impressed by the physical infrastructure.	**Score: 7/10.** Strong hardware foundation is acknowledged by all, but access limitations hinder optimal skill development. The infrastructure is present but not yet pervasive.

2. Quality & Modernity	Simulators described as "highly realistic" and "on par with modern bridge technology." Some concerns about the aging software on certain desktop simulators.	Noted a "refresh cycle" challenge, where software updates lag behind rapid industry technological advances.	Viewed as "adequate for foundational training" but questioned if the simulation scenarios reflect the very latest integrated bridge systems and automation.	**Score: 7.5/10.** Quality is generally high, especially for core competencies, but a gap exists in replicating the cutting-edge, fully integrated digital environment of the newest vessels.
3. Reliability & Support	Reported occasional technical glitches that disrupted training sessions. IT support was seen as "responsive but not always immediately available.	Highlighted dependency on external vendors for complex repairs, leading to delays. A need for more dedicated technical staff was emphasized.	Not directly observed, but reliability is assumed to be a prerequisite for effective training.	**Score: 6/10.** Operational reliability and swift technical support emerge as a vulnerable link in the digital training value chain, potentially undermining learning continuity.

The data indicates that the institution has successfully established a solid foundation of digital infrastructure. As one graduate from Batch 63 stated, "The simulator was our playground to make mistakes without sinking a real ship." However, the theme of "constrained access" was pervasive. An educator elaborated, "We have one multi-million-dollar simulator for 150 cadets. The math simply doesn't allow for the immersive, repeated practice that builds true mastery." This suggests that the effectiveness of the technology is mediated not just by its quality, but by its availability, a finding that moves beyond simple binary assessments of technology presence or absence

Table 2. Analysis of Pedagogical Integration & Learning Innovation

Indicator	Graduate Perspective	Educator Perspective	Industry Perspective	Composite Analysis & Score
Curriculum Alignment	Perceived a disconnect between simulator exercises and theoretical classroom lessons. Exercises often felt like isolated tests rather than integrated learning.	Admitted challenges in curriculum redesign. "We inserted simulators into the old curriculum instead of building a new one around the technology.	Expected a curriculum that teaches "systems thinking" and "digital troubleshooting," not just button-pushing procedures.	**Score: 5/10**. A significant "pedagogy-technology gap" is evident. Technology is used as an add-on rather than a transformative tool for curriculum delivery, limiting its potential impact.
Instructor Proficiency	Noted a wide variation; some instructors were "digital natives" who enhanced learning, while others struggled with the	Noted a "refresh cycle" challenge, where software updates lag behind rapid industry technological advances.	Emphasized that instructor competence is critical. "A poor instructor on a great simulator is worse than a great instructor on a poor simulator.	**Score: 6/10.** Human capacity is a critical bottleneck. Investment in technology is not being matched by investment in the

	technology, slowing down sessions.			faculty development required to leverage it effectively.
Innovative Methodologies	Experienced primarily demonstration-and-repeat exercises. Limited exposure to AI-driven adaptive learning or complex, multi-domain scenario-based training.	Highlighted dependency on external vendors for complex repairs, leading to delays. A need for more dedicated technical staff was emphasized.	Called for more training in "soft skills" like decision-making and communication using digital tools, not just technical operation.	**Score: 5.5/10.** The use of technology remains largely conventional, falling short of the innovative, student-centered, and competency-based methodologies required for deep learning.

The analysis of pedagogical integration reveals the study's most critical finding. The data suggests that the mere presence of technology does not automatically equate to innovative learning. A graduate's comment, "We learned how to use the ECDIS, but not why we would choose one setting over another in a tricky situation," highlights a surface-level approach to digital competency. This aligns with an educator's candid observation: "We are teaching digital literacy, but we need to be teaching digital fluency." The gap is not in the tools, but in the educational philosophy governing their us.

Table 3. Analysis of Competency Development & Career Readiness

Indicator	Graduate Perspective	Educator Perspective	Industry Perspective	Composite Analysis & Score
Technical Skill Mastery	Felt "very confident" in performing standard procedures on simulated equipment. Felt less confident in troubleshooting system failures or interpreting complex data outputs.	Believed graduates leave with solid foundational skills. Worried that the training doesn't fully prepare them for the idiosyncrasies of different proprietary systems used in the industry.	Agreed that graduates have the basic skills. Noted a common "first-job knowledge gap" where graduates take 3-6 months to become truly productive with the specific systems onboard.	**Score: 7/10.** Strong foundation is achieved, but the transition from procedural competence to adaptive expertise in real-world, variable environments is incomplete**.**
Career Adaptation	Reported a "steep learning curve" during the first few months at sea, primarily related to the integration of various digital systems and the pace of work.	Hoped that the training reduced this curve but had limited formal feedback mechanisms to track graduate performance.	Stated that graduates from STIP are "among the better prepared" in Indonesia, but still require significant onboard mentoring, which has a tangible cost.	**Score: 7/10.** The education provides a crucial head start, but does not fully bridge the gap between the simulated academic environment and the commercial pressures of the maritime industry.

Digital Mindset	A minority of graduates spoke in terms of leveraging data for efficiency. Most viewed digital systems as tools to be operated as instructed.	The curriculum was seen as focusing more on compliance and operation than on innovation and optimization using digital data.	The industry seeks officers who can "interrogate" the data from ship performance monitoring systems to save fuel and prevent maintenance issues—a skill set rarely seen in new hires.	**core: 5.5/10.** The development of a proactive, analytical, and optimization-focused digital mindset represents a significant future challenge for MET.

The outcomes in terms of competency and career readiness are positive but reveal a ceiling effect. The training produces competent operators but falls short of cultivating the digital innovators and optimizers that the industry is beginning to demand. An industry representative summarized this succinctly: "We don't need someone who can just follow the route on the ECDIS. We need someone who can analyze the ECDIS data, the weather data, and the engine performance data to find the most fuel-efficient and safe route. That is the officer of the future.

Discussion

Connecting Findings to Research Questions

This research set out to understand how stakeholders perceive the integration of digital technologies in maritime education at STIP Indonesia and its influence on competency development. The findings provide a clear, albeit complex, answer. The integration is perceived as effective in establishing a strong technical foundation but inefficient in achieving deeper pedagogical transformation and fostering advanced cognitive skills. The central research question is therefore partially answered: while digital tools are recognized as vital and are being implemented with notable success in infrastructure terms, their potential to revolutionize learning and produce industry-ready "digital natives" is hampered by systemic issues of access, pedagogical alignment, and faculty development.

The data strongly supports the existence of the "technology-pedagogy mismatch" hypothesized in the introduction. This study empirically validates the concerns raised by scholars [4], who argued that technological investments in sustainability and education often outpace the development of implementation frameworks. In the context of STIP Indonesia, the world-class simulators (the technology) are often utilized within a traditional, instructionist pedagogy, thus limiting their power to foster the critical thinking and adaptive problem-solving skills required for modern seafaring. This finding directly addresses a gap in the literature identified by Caldas [5], which often focuses on quantitative efficiency metrics of ports and shipping, by providing qualitative depth to the human resource development challenges that underpin those efficiencies.

Analyzing Meaning, Importance, and Practical Implications

The most significant finding of this research is that the primary barrier to effective digital transformation in MET is not financial or technological, but rather cultural and pedagogical. The "constrained access" and "pedagogy-technology gap" themes are not merely operational issues; they are symptoms of an educational model that has not yet fully adapted to the possibilities of digital tools. This aligns with global discussions on educational technology, where the focus is shifting from procurement to integration [2]. The importance of this finding is profound: continued investment in hardware without a parallel, and perhaps prioritized, investment in curriculum redesign and faculty upskilling will yield diminishing returns.

The practical implications are clear. For MET institutions like STIP Indonesia:

1. **Strategic Rebalancing**: Strategic plans must rebalance investment from solely hardware to a blend of hardware, software, and "human-ware." This includes creating dedicated budgets and time for faculty training in digital pedagogy.
2. **Curriculum Redesign**: A wholesale revision of the curriculum is needed, moving from a model where technology is "inserted" to one where learning outcomes are achieved through technology. This involves developing complex, multi-scenario simulations that integrate navigation, engineering, and commercial decision-making, as envisioned in the concept of "digital twins" for education.
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For the broader Indonesian maritime economy, these findings are a call to action. The competitiveness of the national fleet and the efficiency of its ports are directly linked to the quality of its human capital [3]. A workforce that is only partially prepared for digitalization will lead to higher operational costs, greater safety risks, and an inability to comply with increasingly complex environmental regulations like the Carbon Intensity Indicator (CII). Therefore, supporting MET's digital transformation is not just an educational policy but a critical economic and social development strategy.

Strengths, Limitations, and Future Research

A key strength of this research is its methodological triangulation. By weaving together the voices of graduates, educators, and industry, it provides a 360-degree view of the issue that would be impossible to capture through a single-method study. The qualitative approach allowed for the discovery of the deeply ingrained "pedagogy-technology gap," a nuance that might have been missed in a large-scale survey.

However, the study is not without limitations. The sample, while diverse, is from a single institution, which may limit the generalizability of findings to all MET institutions in Indonesia, particularly those with fewer resources. Furthermore, the reliance on self-reported perceptions, while valuable, could be complemented by objective measures of competency in future studies.

Based on these findings and limitations, future research should:

1. Conduct a longitudinal study tracking the career progression of graduates to quantitatively correlate their exposure to specific digital pedagogies with their career advancement and performance evaluations.
2. Develop and test a new, integrated digital maritime education curriculum based on the principles of competency-based education and systems thinking, measuring its effectiveness against the traditional model.
3. Develop and test a new, integrated digital maritime education curriculum based on the principles of competency-based education and systems thinking, measuring its effectiveness against the traditional model.

In conclusion, this research demonstrates that STIP Indonesia stands at a crossroads. It has successfully navigated the first wave of digital transformation by acquiring advanced infrastructure. The journey ahead, however, requires a more profound shift—from using digital technology to support traditional teaching to allowing it to redefine the very nature of maritime education and training. By addressing the critical gaps in access, pedagogy, and mindset identified here, STIP Indonesia can solidify its position as a leader not just in Indonesian maritime education, but as a model for MET institutions in developing economies worldwide, ultimately powering a more efficient, safe, and sustainable maritime future for Indonesia

CONCLUSION

This study concludes that while STIP Indonesia has established a robust foundation in digital maritime education infrastructure, a significant "pedagogy-technology gap" inhibits its full potential. The research demonstrates that effective competency development transcends mere access to advanced simulators; it is contingent upon their deep integration into a redesigned, innovative curriculum and supported by continuous faculty development. The findings affirm that graduates attain solid operational proficiency, yet the institution must now prioritize cultivating higher-order digital fluency and an analytical mindset to meet evolving industry demands. This transition is not merely an educational imperative but a strategic necessity for enhancing Indonesia's maritime competitiveness, safety, and environmental sustainability. Ultimately, closing this gap is crucial for transforming the nation's maritime human resources into proactive navigators of the digital era, fully realizing Indonesia's potential as a global maritime fulcrum**.**

REFERENCES

[1] V. Braun and V. Clarke, “Using thematic analysis in psychology,” *Qualitative Research in Psychology*, vol. 3, no. 2, pp. 77–101, 2006.

[2] P. Caldas, M. I. Pedro, and R. C. Marques, “An assessment of container seaport efficiency determinants,” *Sustainability*, vol. 16, no. 11, p. 4427, 2024.

[3] J. W. Creswell and C. N. Poth, *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, 4th ed. Thousand Oaks, CA: SAGE Publications, 2018.

[4] H. Paridaens and T. Notteboom, “National integrated maritime policies (IMP): Vision formulation, regional embeddedness, and institutional attributes for effective policy integration,” *Sustainability*, vol. 13, no. 17, p. 9557, 2021.

[5] K. Zhou, X. Yuan, Z. Guo, J. Wu, and R. Li, “Research on sustainable port: Evaluation of green port policies, vol. 16.