Jurnal Nispatti
Journal of Pedagogy and Educational Studies
Journal Homepage:
https://ejournal.scadindependent.org/index.php/nispatti

Vol. 11, No. 1, February 2026	Copyright © 2026, is licensed under a CC-BY-SA
Pages: 23-40	Publisher: SCAD Independent
DOI: https://doi.org/10.26811/nispatti.v11i1.227	E-ISSN: 2621-6094

Industry Competency Needs Analysis for Outcome-Based Education (OBE) Curriculum Development

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Article Info

Received: October 20, 2025
Accepted: January 23, 2026
Published: February 28, 2026
Online First: February 28, 2026

Keywords

Industry Competencies;
Outcome-Based Education (OBE);
Curriculum;
Information Technology;
Higher Education.

Abstract

Rapid technological transformation has reshaped workplace competency requirements, challenging higher education institutions to develop curricula that remain relevant to evolving industrial needs. Although Outcome-Based Education (OBE) has been widely adopted, curriculum development frequently relies on institutional assumptions rather than systematic evidence regarding workplace competency expectations. This study analyzes workplace competency requirements as an empirical basis for developing an OBE curriculum in the Information Technology Education (PTI) Study Program. A sequential explanatory mixed-methods design was employed, involving 219 stakeholders, including teachers, lecturers, students, alumni, and ICT industry practitioners. Quantitative data were analyzed using descriptive statistics and simple linear regression, while qualitative data were examined through thematic analysis. The findings indicate that workplace competency requirements were perceived at a very high level (Mean = 4.23), whereas the suitability of the existing OBE curriculum was rated high (Mean = 4.06). Regression analysis revealed a positive and significant relationship between workplace competencies and curriculum suitability ($\beta = 0.672$, $R^2 = 0.299$, $p < 0.05$). This study contributes by proposing stakeholder-driven workplace competency mapping as an evidence-based foundation for OBE curriculum development, extending the conventional focus of OBE from curriculum alignment toward industry-responsive curriculum design. These findings provide practical guidance for strengthening curriculum relevance, graduate employability, and sustainable university–industry collaboration.

A. Introduction

The accelerating convergence of artificial intelligence (AI), big data, cloud computing, and digital technologies is rapidly transforming the global labor market, fundamentally redefining the competencies expected from university graduates across almost every professional sector (Pereira et al., 2017; Bertschek, 2018; Jonker & Petković, 2014). Rather than merely changing industrial processes, this transformation has shifted employer expectations toward graduates who possess integrated technical expertise, digital adaptability, interdisciplinary thinking, and lifelong learning capabilities (Nyale et al., 2025; Lukitasari et al., 2025; Kayyali, 2025). However, higher education institutions in many countries continue to struggle in aligning curriculum design with these rapidly evolving competency requirements, resulting in persistent graduate skill mismatches and declining workforce readiness (Pattanapairoj et al., 2020; Witt & Lill, 2010; Singh et al., 2025). This growing disparity has become a global concern because curriculum relevance is now recognized as one of the primary determinants of graduate employability and institutional competitiveness in the era of digital transformation (Chiuariu et al., 2024; Recalde & Werewka, 2024).

Outcome-Based Education (OBE) has emerged as one of the most widely adopted educational approaches to address this challenge by shifting curriculum development from content-oriented teaching toward measurable learning outcomes (Joseph et al., 2024; Spady, 1994). Within the OBE paradigm, every component of curriculum design—including Graduate Learning Outcomes (CPL), learning experiences, instructional strategies, and assessment systems—must be systematically aligned with stakeholder expectations and labor market demands (Kumaravel et al., 2024; Harden, 2007). Nevertheless, despite its widespread adoption, the implementation of OBE frequently remains procedural rather than evidence driven. Many higher education institutions continue to formulate curricula based on institutional assumptions instead of empirical analyses of contemporary workplace competencies, causing curriculum structures to become increasingly disconnected from rapidly changing industrial expectations (Hassan, 2012a; Singh & Singh, 2023; Faisal et al., 2021).

Previous studies have consistently demonstrated that Outcome-Based Education (OBE) contributes significantly to improving educational quality by promoting learner-centered instruction, strengthening constructive alignment between learning outcomes, teaching strategies, and assessment, and enhancing students' academic achievement and employability (Pavani et al., 2020; Ohatkar & Deshpande, 2022; Joseph et al., 2024). OBE has

also been recognized as an effective framework for curriculum quality assurance because it enables higher education institutions to establish measurable graduate learning outcomes, monitor competency attainment systematically, and continuously improve curriculum performance through evidence-based evaluation (Aminah et al., 2025; Kumaravel et al., 2024; Harden, 2007). Beyond pedagogical improvement, recent studies further emphasize that OBE strengthens institutional accountability, promotes stakeholder engagement in curriculum development, and facilitates closer alignment between higher education and labor market expectations, particularly in disciplines experiencing rapid technological transformation (Li & Rohayati, 2024; Kayyali, 2025; Chiuariu et al., 2024). Consequently, OBE has become one of the dominant paradigms adopted by universities worldwide to enhance graduate competitiveness in increasingly dynamic and technology-driven employment environments (Singh & Singh, 2023; Recalde & Werewka, 2024).

Despite these well-documented advantages, accumulating evidence suggests that successful OBE implementation extends far beyond redesigning curriculum documents or reformulating graduate learning outcomes. Rather, its effectiveness depends on continuous institutional commitment, systematic curriculum evaluation, lecturer readiness, authentic competency-based assessment, sufficient learning resources, and sustained collaboration with external stakeholders (Hassan, 2012a; Hassan, 2012b; Kumaravel et al., 2024; Siti Romlah et al., 2025). Numerous studies therefore argue that many universities have formally adopted the principles of OBE without fundamentally transforming their teaching practices, assessment culture, and curriculum governance, resulting in only partial realization of its intended educational outcomes (Mufanti et al., 2024a; Mufanti, 2025).

Several implementation challenges further limit the effectiveness of OBE in higher education. Although many lecturers report adequate conceptual understanding of OBE principles, traditional teacher-centered instructional practices continue to dominate classroom implementation (Utami & Agung, 2021; Mufanti et al., 2024a; Salim et al., 2026). The transition toward outcome-oriented learning is further constrained by excessive academic workloads, limited institutional commitment, insufficient learning infrastructure, and the absence of authentic assessment systems capable of measuring complex graduate competencies (Mufanti, 2025; Siti Romlah et al., 2025; Hassan, 2012b). Consequently, a substantial gap persists between theoretical understanding and practical implementation, limiting the ability of OBE curricula to respond effectively to technological disruption and changing workforce expectations. These findings suggest that curriculum reform should no

longer rely solely on pedagogical considerations but must be informed by systematic evidence regarding actual industrial competency requirements (Mufanti et al., 2024b).

This issue becomes particularly critical in Information Technology Education (PTI), where graduates are expected to simultaneously master educational competencies required for professional teaching and advanced technological competencies demanded by the digital industry. The dual professional identity of PTI graduates requires curriculum structures capable of integrating pedagogical knowledge with emerging technological expertise, including artificial intelligence, cloud computing, data science, digital collaboration, and innovation capabilities. However, empirical evidence regarding how these industrial competency expectations should be translated into OBE curriculum design remains limited. Existing studies have primarily examined OBE implementation from pedagogical, institutional, or policy perspectives, while relatively little attention has been devoted to systematically mapping stakeholder competency needs as the empirical foundation for curriculum development (Li & Rohayati, 2024).

Therefore, this study seeks to address this gap by analyzing workplace competency requirements from multiple stakeholder perspectives—including teachers, lecturers, students, alumni, and ICT industry practitioners—as an empirical basis for developing an Outcome-Based Education curriculum in the Information Technology Education Study Program. Using a sequential explanatory mixed-methods design, this study not only identifies the competencies currently demanded by educational institutions and the technology industry but also examines how these competencies should be translated into curriculum components within the OBE framework. The findings are expected to contribute both theoretically by strengthening evidence-based curriculum development within Outcome-Based Education and practically by providing adaptive curriculum recommendations that improve graduate employability, institutional responsiveness, and long-term alignment between higher education and industrial transformation.

Based on the theoretical and empirical arguments presented above, this study adopts an integrated conceptual framework that combines work competency theory (Spencer & Spencer, 1993, 2008), Outcome-Based Education theory (Spady, 1994), and the education–industry linkage model (Harden, 2007). These complementary perspectives provide the conceptual foundation for examining how workplace competency requirements influence the suitability of the Outcome-Based Education curriculum in the

Information Technology Education Study Program. The proposed conceptual framework is presented in Figure 1.

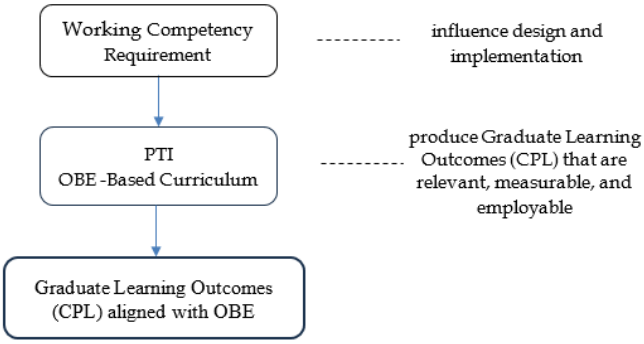

Figure 1. Conceptual Framework of the Study

B. Method

This study employed a mixed-methods approach using a sequential explanatory design, in which quantitative data were collected and analyzed first, followed by qualitative inquiry to explain and elaborate the quantitative findings (Ivankova et al., 2006). The study involved five stakeholder groups closely associated with the development of the Information Technology Education (PTI) curriculum. Participants were selected through purposive sampling to ensure that they possessed relevant knowledge and experience regarding industrial competency needs and curriculum implementation (Tongco, 2007). A total of 219 respondents participated in the study, consisting of teachers (n = 48), lecturers (n = 18), students (n = 47), alumni (n = 74), and ICT industry practitioners (n = 32). Quantitative data were collected using a structured questionnaire with a five-point Likert scale, whereas qualitative data were obtained through in-depth interviews and Focus Group Discussions (FGDs).

This study examined two principal variables: (X) Workplace Competencies and (Y) the Suitability of the OBE-Based PTI Curriculum. The questionnaire instrument was developed from relevant literature and evaluated through expert judgment to establish content validity. The instrument demonstrated excellent internal consistency, with Cronbach's Alpha coefficient exceeding 0.90, indicating very high reliability. Quantitative data were analyzed using descriptive statistics (mean and standard deviation) to identify the level of stakeholder perceptions, followed by simple linear regression to examine the influence of workplace competencies on the suitability of the OBE curriculum. Qualitative data were analyzed using thematic analysis, and the integration of quantitative and

qualitative evidence was strengthened through methodological triangulation to enhance the credibility and trustworthiness of the findings.

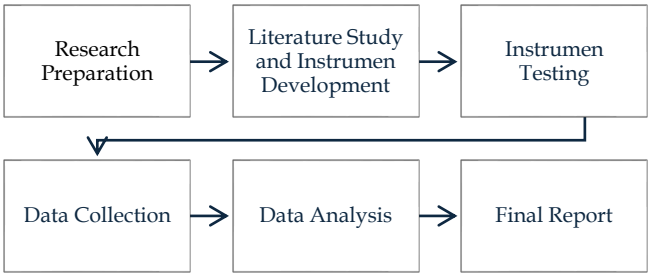

Figure 2. Research Procedure

To achieve a thorough assessment of the industrial skills necessary for creating the OBE curriculum at PTI, a meticulous process is essential to ensure that the findings align with the research objectives. As illustrated in Figure 2 above, the phases consist of research preparation and preliminary analysis, followed by a literature review and the creation of research instruments, which are then subjected to trials or testing. Data gathering and analysis occur once the testing of the instruments is completed. Finally, the research findings are summarized and presented in a comprehensive report along with documents that will act as references for the development of the curriculum.

This study adhered to the ethical principles governing educational research involving human participants. Participation was entirely voluntary, and all respondents were informed of the objectives of the study prior to data collection. Informed consent was obtained from every participant, who retained the right to decline participation or withdraw from the study at any stage without consequence. No personally identifiable information was collected, and all responses were anonymized and treated confidentially. The collected data were used exclusively for academic research purposes and reported in aggregate form to protect participants' privacy and confidentiality.

C. Results and Discussion

This section presents the findings of the study based on both quantitative and qualitative analyses. The quantitative results describe stakeholders' perceptions of workplace competency requirements and the suitability of the Outcome-Based Education (OBE) curriculum, followed by regression analysis to examine the relationship between the two variables. The qualitative findings are subsequently integrated into the discussion

to provide deeper explanations, interpret the quantitative results, and formulate evidence-based implications for OBE curriculum development.

1. Results

The findings presented in this section summarize the quantitative results obtained from 219 respondents representing teachers, lecturers, students, alumni, and ICT industry practitioners. The results are organized according to the two variables examined in this study: Workplace Competencies (Variable X) and the Suitability of the Outcome-Based Education (OBE) Curriculum (Variable Y). Descriptive statistics were used to describe the distribution of stakeholder perceptions across each indicator, including the mean score, standard deviation, and category of each variable.

The descriptive analysis of Variable X (Workplace Competencies) indicates that respondents perceived the competency requirements expected by the workplace to be at a very high level. The overall mean score reached 4.23 with a standard deviation of 0.79, suggesting a consistently high level of agreement among respondents regarding the importance of workplace competencies for graduates of the Information Technology Education (PTI) Study Program. Across all competency indicators, the mean scores ranged from 3.97 to 4.41, demonstrating that every competency measured in this study was regarded as important in preparing graduates to meet current educational and industrial demands.

Table 1: Descriptive Statistics of Variable X

Competency Indicators	Mean	SD	Category
Mastery of the latest technology (AI, Data, Cloud)	4.41	0.71	Very high
Programming and application development skills	4.35	0.78	Very high
Database management & information systems	4.32	0.82	Very high
ICT integration in learning (TPACK, LMS)	4.26	0.74	Very high
Digital communication & collaboration skills	4.24	0.67	Very high
Professional soft skills (work ethic, teamwork, leadership)	4.21	0.80	Very high
Technology-based creativity and problem-solving	4.18	0.84	High
Adaptability to technological change	4.12	0.79	High
Digital research and innovation capabilities	4.05	0.83	High
Utilization of online learning platforms & multimedia	3.97	0.91	High
Overall average of variable X	**4.23**	**0.79**	Very high

As presented in Table 1, the highest-rated competency was mastery of emerging technologies, including Artificial Intelligence (AI), Data Analytics, and Cloud Computing, with a mean score of 4.41. This was followed by programming and application development skills (Mean = 4.35) and database management and information systems (Mean = 4.32), both of which were also categorized as Very High. These results show that competencies associated with rapidly developing digital technologies consistently received the highest ratings among respondents.

Similarly, competencies related to ICT integration in learning (TPACK and Learning Management Systems) obtained a mean score of 4.26, while digital communication and collaboration skills achieved a mean score of 4.24. Professional soft skills, including work ethic, teamwork, and leadership, also received a very high assessment with a mean score of 4.21. The relatively small standard deviations across these indicators indicate that respondents shared similar perceptions regarding their importance, suggesting a high level of consistency across different stakeholder groups.

The remaining competency indicators were categorized as High, although all maintained mean scores close to the upper end of the measurement scale. Technology-based creativity and problem-solving obtained a mean score of 4.18, followed by adaptability to technological change (Mean = 4.12) and digital research and innovation capabilities (Mean = 4.05). The lowest mean score among all competency indicators was observed for the utilization of online learning platforms and multimedia (Mean = 3.97). Despite being the lowest-ranked indicator, its score remained within the High category, indicating that respondents consistently regarded every competency dimension included in this study as relevant for curriculum development.

The descriptive analysis for Variable Y (Suitability of the OBE-Based PTI Curriculum) also demonstrates positive stakeholder perceptions. The overall mean score reached 4.06 with a standard deviation of 0.88, placing the overall curriculum suitability within the High category. These findings indicate that respondents generally perceived the existing curriculum as being aligned with the principles of Outcome-Based Education across its major components.

Table 2: Descriptive Statistics of Variable X

Competency Indicators	Mean	SD	Category
Relevance of graduate learning outcomes (CPL) to industry needs	4.30	0.85	Very high
Learning Outcomes (CPMK) and Semester Learning	4.22	0.78	Very high

Competency Indicators	Mean	SD	Category
Plan (RPS) Synchronization with OBE Implementation of outcome-based assessment	4.17	0.91	High
Adaptability of the curriculum to technological trends	4.15	0.87	High
Quality of Field Experience, Practice, and Student Internships	4.12	0.84	High
Industry involvement in curriculum development	4.07	0.89	High
OBE facilities and laboratory support	3.98	0.95	High
Graduates' ability to apply OBE	3.92	0.86	High
Effectiveness of project-based learning (*project-based learning*)	3.86	0.94	High
Consistency of evidence-based assessment (OBE rubric)	3.79	0.92	High
Overall average of variable Y	**4.06**	**0.88**	**High**

Table 2 shows that the highest-rated curriculum component was the relevance of Graduate Learning Outcomes (CPL) to industry needs, which obtained a mean score of 4.30 and was categorized as Very High. This was followed by the alignment between Course Learning Outcomes (CPMK) and Semester Learning Plans (RPS) within the OBE framework, with a mean score of 4.22, also classified as Very High. These two indicators recorded the highest evaluations among all curriculum components measured in this study.

Several other curriculum dimensions also received high ratings. Implementation of outcome-based assessment achieved a mean score of 4.17, while curriculum adaptability to technological developments obtained 4.15. Likewise, the quality of field experience, teaching practice, and student internships received a mean score of 4.12, followed by industry involvement in curriculum development with a mean score of 4.07. These results indicate that multiple curriculum components were consistently perceived positively by respondents.

The remaining curriculum indicators also fell within the High category. OBE facilities and laboratory support recorded a mean score of 3.98, followed by graduates' ability to apply OBE competencies with a mean score of 3.92. The lowest scores were observed for the effectiveness of Project-Based Learning (PjBL) (Mean = 3.86) and the consistency of evidence-based assessment using OBE rubrics (Mean = 3.79). Although these indicators ranked lower than the others, they remained within the High category, indicating that respondents generally perceived all curriculum components positively.

Overall, the descriptive findings demonstrate consistently positive stakeholder perceptions across both research variables. Workplace competencies were rated at a

Very High level, while the suitability of the OBE-based curriculum was rated at a High level. The distribution of mean scores across all indicators remained within the High and Very High categories, reflecting a generally consistent pattern of responses among the stakeholder groups participating in this study.

2. Discussion

The findings of this study demonstrate that the Information Technology Education (PTI) curriculum has generally embraced the principles of Outcome-Based Education (OBE), yet its implementation has not fully accommodated the rapidly evolving competency requirements of the workplace. Although respondents perceived both workplace competencies and curriculum suitability positively, workplace competency requirements received consistently higher evaluations than curriculum implementation. This discrepancy suggests that curriculum development has not progressed at the same pace as industrial transformation. According to Spady (1994), OBE requires curriculum development to begin with clearly defined learning outcomes derived from stakeholder expectations rather than institutional assumptions. Similarly, Joseph et al. (2024) argue that successful OBE implementation depends on the alignment of intended learning outcomes, learning experiences, and assessment systems. The present findings therefore indicate that curriculum quality should be assessed not only by curriculum design but also by the effectiveness of its implementation in preparing graduates for contemporary workplace demands.

One of the most important findings concerns the competencies prioritized by stakeholders. Competencies associated with artificial intelligence, cloud computing, programming, and data management consistently received the highest ratings, indicating a substantial shift in workforce expectations toward advanced digital capabilities. This pattern reflects the accelerating digital transformation occurring across educational institutions and industrial sectors. Kayyali (2025) emphasizes that future graduates must possess adaptive digital competencies to remain competitive in increasingly technology-driven workplaces. Likewise, Nyale et al. (2025) highlight that the widening gap between graduate competencies and industrial expectations has become one of the principal challenges confronting higher education. These findings further support the argument of Bertschek (2018) that technological disruption continuously reshapes occupational profiles, requiring universities to redesign curricula in response to emerging industrial competencies rather than relying solely on conventional disciplinary structures.

Despite the positive perception of curriculum suitability, respondents assigned comparatively lower scores to the effectiveness of project-based learning (PjBL) and evidence-based assessment. This finding suggests that the primary challenge lies not in curriculum formulation but in translating curriculum intentions into effective learning practices. Harden (2007) argues that curriculum alignment requires coherence among learning outcomes, instructional activities, and assessment methods. Likewise, Kumaravel et al. (2024) emphasize that assessment constitutes the core mechanism for determining whether intended competencies have actually been achieved. The relatively lower evaluation of OBE-based assessment observed in this study therefore indicates that implementation remains inconsistent across learning activities. Similar implementation challenges have also been reported by Mufanti et al. (2024a) and Mufanti (2025), who found that many lecturers understand OBE conceptually but continue to employ conventional teaching and assessment approaches.

The present findings also reinforce the multidimensional perspective of Spencer and Spencer (1993; 2008) regarding professional competence. Rather than emphasizing technical expertise alone, respondents consistently assigned high importance to professional soft skills, including teamwork, communication, leadership, and work ethics. This pattern confirms that graduate employability increasingly depends upon balanced competency profiles integrating cognitive, technical, interpersonal, and personal attributes. Similar observations have been reported by Lukitasari et al. (2025), who argue that higher education institutions should develop graduates capable of adapting to technological and organizational change simultaneously. Furthermore, Li and Rohayati (2024) emphasize that technology-oriented education programs should integrate technical knowledge with pedagogical and professional competencies to prepare graduates capable of functioning effectively across diverse educational and industrial environments.

The findings also corroborate previous studies demonstrating the positive contribution of Outcome-Based Education to educational quality while simultaneously extending current understanding of curriculum responsiveness. Earlier investigations have shown that OBE enhances student engagement, improves learning quality, and strengthens institutional quality assurance (Pavani et al., 2020; Ohatkar & Deshpande, 2022; Aminah et al., 2025). Meanwhile, Singh and Singh (2023) argue that curriculum flexibility is essential for maintaining graduate relevance within rapidly changing labor markets. However, most previous studies primarily evaluated OBE implementation after curriculum adoption. In contrast, the present study begins by identifying industrial

competency requirements through multiple stakeholder groups before translating those competencies into curriculum recommendations. This stakeholder-driven perspective provides a broader empirical foundation for curriculum development than approaches relying exclusively on institutional self-evaluation.

A notable contribution of this study lies in demonstrating that workplace competency analysis should constitute the starting point rather than the final stage of curriculum development. Existing OBE literature generally emphasizes constructive alignment among graduate learning outcomes, instructional strategies, and assessment systems. While these elements remain fundamental, the present findings suggest that curriculum alignment should first be informed by systematic evidence regarding industrial competency requirements. This perspective extends the OBE framework proposed by Spady (1994) by positioning stakeholder competency mapping as an integral component of curriculum design. It also complements the education–industry linkage perspective of Harden (2007), which emphasizes sustained interaction between universities and labor market stakeholders to ensure long-term curriculum relevance and graduate employability.

From a practical perspective, the findings provide important implications for curriculum developers, higher education institutions, and policymakers. Curriculum revision should prioritize emerging competencies related to artificial intelligence, cloud computing, programming, digital collaboration, and data management while simultaneously strengthening authentic learning experiences through project-based learning, internships, and industry collaboration. Chiuariu et al. (2024) emphasize that stakeholder engagement plays a central role in ensuring curriculum relevance and continuous quality improvement. Similarly, Recalde and Werewka (2024) argue that universities should establish dynamic curriculum review mechanisms capable of responding to technological change. Continuous professional development for lecturers, supported by institutional commitment and adequate learning infrastructure, therefore becomes essential for ensuring effective implementation of Outcome-Based Education.

Although this study was conducted within the context of the Information Technology Education Study Program in Indonesia, its implications extend beyond the national setting. Universities worldwide are confronting similar challenges in responding to rapid digital transformation, changing workforce expectations, and increasing demands for graduate employability. Consequently, the stakeholder-based curriculum development model

proposed in this study may provide a useful reference for technology-oriented teacher education programs in other developing countries facing comparable circumstances. By integrating industrial competency mapping with Outcome-Based Education principles, this study contributes to international discussions concerning curriculum responsiveness, educational quality, and sustainable higher education reform. Ultimately, the findings reinforce the view that curriculum development should be regarded as a continuous, evidence-based, and collaborative process capable of adapting to ongoing technological and societal transformation rather than as a periodic administrative exercise.

D. Conclusion

This study demonstrates that workplace competency requirements have become the primary reference for developing an adaptive Outcome-Based Education (OBE) curriculum in the Information Technology Education (PTI) Study Program. While stakeholders generally perceived the existing curriculum to be aligned with OBE principles, the findings reveal that curriculum implementation has not yet fully responded to the rapidly evolving competency demands of the digital workplace. Emerging technological competencies, particularly artificial intelligence, cloud computing, data analytics, programming, and professional soft skills, have become the competencies most strongly expected by stakeholders, whereas project-based learning and evidence-based assessment remain areas requiring further improvement.

The principal contribution of this study lies in proposing an evidence-based approach to curriculum development that begins with systematic mapping of workplace competency requirements from multiple stakeholder perspectives. Rather than treating Outcome-Based Education solely as a framework for organizing learning outcomes and assessment, this study positions stakeholder-driven competency analysis as the foundation for curriculum design, thereby strengthening the alignment between higher education and contemporary industrial needs. Practically, the findings provide a reference for universities, curriculum developers, and policymakers in revising OBE-based curricula through stronger industry collaboration, continuous curriculum evaluation, authentic assessment, and the integration of emerging digital competencies into learning experiences. Such efforts are expected to improve graduate employability while enhancing institutional responsiveness to technological transformation.

This study is limited to stakeholders associated with a single Information Technology Education Study Program in Indonesia. Future research is therefore encouraged to involve

broader institutional contexts, comparative cross-country investigations, and longitudinal evaluations to examine how competency-based curriculum reforms influence graduate performance and employability across diverse educational and industrial settings.

Acknowledgments

The authors thank Universitas Islam Negeri Ar-Raniry for their valuable sponsorship in this research and publication. We also thank the anonymous peer reviewers for their insightful point of view on the article.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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