



## Strategies to Improve Vocational Graduate Employability: A Systematic Literature Review (2020-2025)

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### Article History:

Received: Nov 22, 2025

Revised: Jan 08, 2026

Accepted: Jan 11, 2026

Online First: Jan 30, 2026

### Keywords:

Industry 4.0,  
Systematic Literature  
Review,  
Vocational Education,  
Employability,  
Work-Based Learning.

### Kata Kunci:

Industri 4.0,  
Kemampuan Kerja,  
Pembelajaran Berbasis Kerja,  
Pendidikan Vokasi,  
Tinjauan Literatur Review.

### How to cite:

Rusmiyati, L., Listyasari, W. D., Effendi, M. S., & Kamaludin, K. (2026). Strategies to Improve Vocational Graduate Employability: A Systematic Literature Review (2020-2025). *Edunesia : Jurnal Ilmiah Pendidikan*, 7(1), 700-714.

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**Abstract:** Digital transformation, workforce globalization, and Industry 4.0 require rapid adaptation in vocational education to prepare competitive graduates for the global labour market. This study identifies strategies to enhance vocational graduates' employability and maps thematic clusters and Research trends. We conducted a systematic literature review with a PRISMA bibliometric analysis. A search in Scopus and Google Scholar retrieved 400 records; after removing duplicates, screening, applying inclusion/exclusion criteria (peer-reviewed journals indexed in Scopus or SINTA 1-2, full text, relevance), and quality assessment, 44 articles (2020-2025) were analyzed. Bibliometric and thematic synthesis revealed five clusters: (1) digital transformation and Industry 4.0-oriented learning, (2) work-based learning and dual systems, (3) skills development and employability, (4) policy and governance, and (5) entrepreneurship and career development. Findings show that employability is strengthened by integrating technical and soft skills, fostering industry partnerships, improving digital literacy, enhancing teacher competence, and adopting adaptive governance. The study proposes an integrated framework linking digital transformation, learning, and governance, and offers evidence-based guidance for policymakers, institutions, and stakeholders to design responsive vocational strategies aligned with Industry 4.0.

**Abstrak:** Transformasi digital, globalisasi tenaga kerja, dan Industri 4.0 menuntut pendidikan vokasi beradaptasi untuk menyiapkan lulusan kompetitif di pasar kerja global. Penelitian ini mengidentifikasi strategi meningkatkan employability lulusan vokasi serta memetakan kluster tematik dan tren penelitian. Dilakukan Tinjauan Literatur Sistematis (SLR) dipadukan analisis bibliometrik sesuai pedoman PRISMA. Pencarian di Scopus dan Google Scholar menghasilkan 400; setelah penghapusan duplikat, penyaringan, penerapan kriteria inklusi/eksklusi (jurnal peer-review terindeks Scopus atau SINTA 1-2, teks lengkap, relevansi), dan penilaian kualitas, 44 artikel (2020-2025) dianalisis. Sintesis bibliometrik dan tematik mengungkap lima kluster utama: (1) transformasi digital dan pembelajaran vokasi berorientasi Industri 4.0, (2) pembelajaran berbasis kerja dan sistem ganda, (3) pengembangan keterampilan dan employability, (4) kebijakan dan tata kelola pendidikan vokasi, dan (5) kewirausahaan serta pengembangan karir. Temuan menunjukkan peningkatan employability didorong oleh integrasi keterampilan teknis dan lunak, kemitraan industri kuat, peningkatan literasi digital dan kompetensi pendidik, serta tata kelola adaptif. Studi ini mengusulkan kerangka konseptual terintegrasi dan memberikan panduan berbasis bukti bagi pembuat kebijakan, lembaga, dan pemangku kepentingan untuk merancang strategi vokasi responsif sesuai Industri 4.0.

## A. Introduction

Vocational education plays a strategic role in strengthening workforce competitiveness amid the global economic transformation driven by digitalisation, automation, and changing job structures. Countries with responsive and adaptive vocational education systems are better able to produce graduates who are productive, flexible, and competitive in the international job market (Rözer & Werfhorst, 2020; McGrath & Yamada, 2023). In this context, aligning the competencies of vocational graduates with the needs of global industry is a priority, including in Indonesia, which faces challenges posed by a demographic bonus and cross-border labour mobility (Li & Pilz, 2023).

However, various studies show that vocational education still faces a significant skills mismatch between learning outcomes and workplace demands. Vocational graduates often have limited industry experience, low job-readiness, and a lack of transversal competencies needed in the global job market (Okolie, 2020; Fauzan et al., 2023). This situation indicates that improvements in the quality and relevance of graduate competencies have not kept pace with increased access to vocational education.

The development of the Industrial Revolution 4.0 and the accelerated adoption of digital technology further emphasize the urgency of transforming vocational education. Digital literacy, mastery of cutting-edge technology, and the use of smart technology in learning are key prerequisites for graduates' job readiness (Saniuk et al., 2022; Antonietti et al., 2022; Wu, 2024). Several recent studies also confirm that teachers' digital competence is a key factor in the use of learning technology, which in turn affects the digital readiness of vocational students (Antonietti et al., 2022; Habibi et al., 2023).

In addition to digital aspects, work-based learning approaches such as work-based learning, dual systems, industrial internships, and project-based learning have proven effective in increasing the employability of vocational graduates (Barrera-Osorio et al., 2023; Rintala & Nokelainen, 2020). In addition to technical competency, mastery of soft skills, creativity, and self-efficacy are also important determinants of graduates' successful transition into the workforce (Magee et al., 2022; Sutiman et al., 2022). In fact, strengthening vocational entrepreneurship is increasingly seen as a relevant adaptive strategy for addressing global job-market uncertainty (Bano et al., 2022; Triyono et al., 2023).

The COVID-19 pandemic has become a catalyst for accelerating the transformation of vocational education through flexible and digital-based learning. While it poses challenges to work-based learning practices, the pandemic has also broadened the discourse on pedagogical innovation, equitable access to vocational education, and the inclusion of vulnerable groups (Syauqi et al., 2020; Schmid & Garrels, 2021). Recent studies have also highlighted the long-term contribution of vocational education to economic development and labour market resilience (Samoliuk et al., 2021; McGrath & Yamada, 2023).

Despite the rapid growth of literature on vocational education, existing Research remains fragmented. Most studies address partial strategies for improving graduate quality, for example, in areas such as digitalisation, curriculum, or industry partnerships, without a comprehensive synthesis that systematically maps key thematic clusters, Research trends,

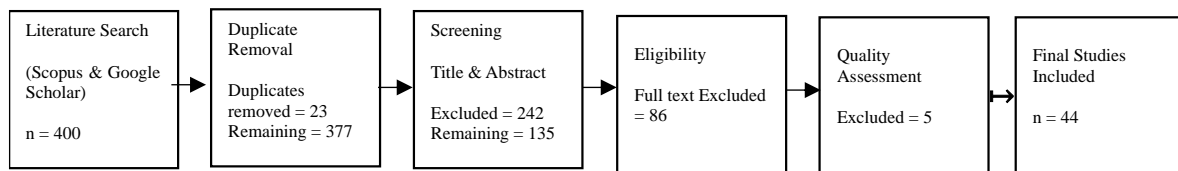
and Research gaps. Furthermore, studies that specifically synthesize Scopus- and SINTA 1-2-indexed literature from the current period (2020–2025) using bibliometric and SLR approaches remain very limited. This situation indicates a Research gap in providing integrated scientific evidence as a basis for policy-making and developing vocational education practices.

Based on these gaps, the novelty of this Research lies in its attempt to present a comprehensive synthesis of strategies to improve the employability of vocational graduates through a Systematic Literature Review and bibliometric analysis. This Research not only identifies dominant strategies but also maps thematic clusters, current Research trends, and under-explored Research gaps, thus providing theoretical and practical contributions to the development of globally competitive vocational education.

In line with the identified Research gap, this study is guided by the following Research questions: (RQ1) What are the main topics and thematic clusters in vocational education Research related to strategies for improving graduate competency and employability? (RQ2) What Research gaps remain in the development of vocational education strategies to enhance graduate employability? Moreover, (RQ3) What are the dominant Research trends in vocational education during the 2020–2025 period in the context of improving graduate quality and global competitiveness? Accordingly, this study aims to: (1) identify the main topics and thematic clusters of vocational education Research related to strategies for improving graduate competency and employability; (2) analyze existing Research gaps as directions for future Research; and (3) map vocational education Research trends from 2020 to 2025. This study was conducted through a Systematic Literature Review of 44 reputable articles indexed in Scopus and SINTA 1-2.

## **B. Method**

This study employed a Systematic Literature Review (SLR) to identify, evaluate, and synthesise scientific evidence on effective strategies to improve the employability of vocational education graduates in the global labour market. The SLR was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency, traceability, and replicability. Scientific articles were retrieved using the Publish or Perish application, with access to the Scopus and Google Scholar databases, covering publications from 2020 to 2025 to capture recent developments in vocational education amid digital transformation and the global workforce. The search used keyword combinations related to vocational education, skills development, and graduate employability. The initial search identified 400 articles (200 from each database); after duplicate removal in Mendeley, 377 articles were screened based on titles and abstracts, resulting in 135. Full-text eligibility assessment and application of inclusion criteria yielded 49 articles, of which five were excluded following methodological quality assessment. Consequently, 44 articles were included in the final analysis. The study selection process is summarised in a Research flow (Figure 1).



**Figure 1.** Research Flow of the Study

To ensure that only relevant articles meeting quality standards were analyzed, this study clearly established inclusion and exclusion criteria during the study selection stage. These criteria were intended to ensure that the selected literature genuinely contributes to the Research objectives, demonstrates publication credibility, and provides sufficient empirical data for the synthesis process. Details of the inclusion and exclusion criteria are presented in Table 1 below.

**Table 1.** Inclusion and Exclusion Criteria

No	Criteria	Inclusion	Exclusion
1	Language	Indonesian or English	Besides Indonesian and English
2	Access	Full text available	Full text not available
3	Index	Indexed journals (Scopus or SINTA 1-2)	SINTA 3-4 indexed journals or from non-indexed journals
4	Relevance	Focus on improving the quality and employability of vocational graduates	Not relevant to the vocational context

Bibliometric analysis was conducted using VOSviewer software to map the Research structure, thematic clusters, and publication trends related to vocational graduate employability. The analysis focused on strategic themes associated with employability improvement and employed a co-occurrence approach using author keywords as the unit of analysis. Full counting was applied with a minimum keyword occurrence threshold of 3 and normalization based on association strength. The bibliometric procedure generated visualizations of keyword networks, thematic clusters, and overlay and density maps, which were used to identify dominant Research focuses, interrelationships among themes, and areas with low Research intensity, indicating potential Research gaps. To complement the bibliometric findings, a narrative synthesis and cross-literature comparison were conducted to interpret patterns, emerging trends, and gaps that warrant further investigation.

In addition to bibliometric analysis, this study applied thematic analysis to synthesize the article's findings. The analysis process followed six stages according to Braun and Clarke, namely: (1) Familiarization of data through thorough reading of the articles; (2) initial coding of relevant findings; (3) grouping codes into initial themes; (4) reviewing and refining themes; (5) defining and naming themes; and (6) compiling a narrative synthesis. The coding process was carried out manually using a data extraction sheet.

The units of analysis in this study include strategies, learning models, educational policies, and supporting factors reported in each article related to improving the

employability of vocational graduates. Data were analyzed through narrative synthesis and cross-literature comparisons to identify patterns of findings, Research trends, and knowledge gaps that require further study.

Through a combination of SLR, bibliometric analysis, and thematic analysis, this study produces a comprehensive scientific mapping of effective strategies for preparing competitive vocational graduates for the global job market, based on empirical evidence from 44 national and internationally reputable articles.

### C. Result

The analysis of 44 selected articles was conducted through a combination of bibliometric analysis and a Systematic Literature Review (SLR) to answer three Research questions (RQ1-RQ3). Bibliometric analysis using VOSviewer generated cluster maps, keyword networks, and publication trends, while SLR was used to synthesize strategic themes emerging from the articles' content. The Research results are presented in a structured manner based on each Research question.

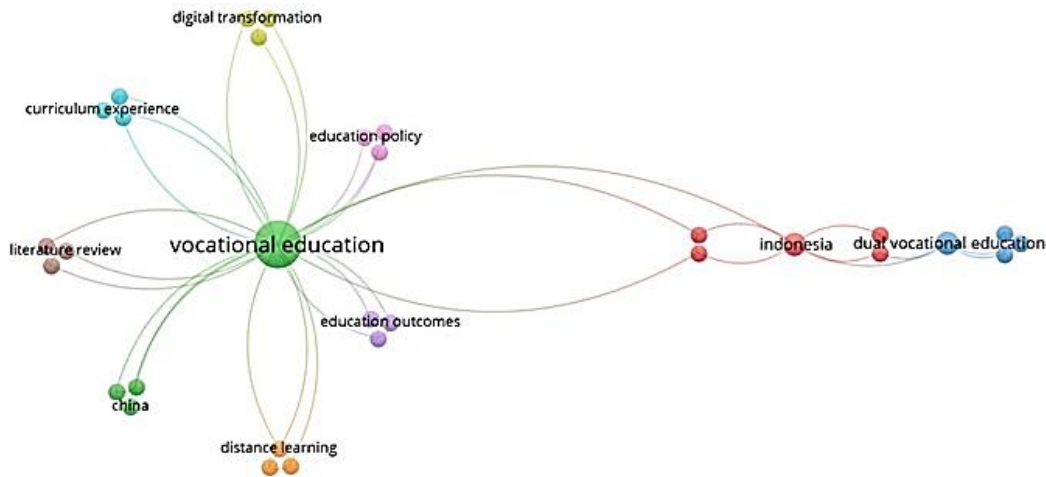
#### Research Topics and Clusters Related to Vocational Education in Improving Graduate Quality (RQ1)

Keyword co-occurrence analysis yielded five main clusters that capture the structure of global vocational education Research during the 2020-2025 period. Bibliometrically, the analysis involved 58 keywords, with 58 nodes, 214 links, and five clusters. The keywords with the highest total link strength were vocational education, digital transformation, employability, and work-based learning, underscoring their central role in the literature.

**Table 2.** Five Main Clusters of the Global Vocational Education Research Structure

Cluster	Main Theme	Strategic Focus	Research Implications
1	Digital Transformation	Integration of LMS, AI, online learning, and industry technologies	Digitalisation is the foundation for vocational graduates' job-readiness.
2	Education Policy & Governance	Policy reform, industry collaboration, vocational governance	Adaptive policies determine the sustainability of vocational quality
3	Work-Based Learning & Dual System	Internships, dual systems, work-based learning	Real work experience increases employability
4	Skills & Employability	Hard skills, soft skills, work readiness	Holistic competencies as the key to work transition
5	Entrepreneurship & Career Development	Entrepreneurship, self-efficacy, career orientation	Graduates are directed to become job creators

Table 2 presents five main thematic clusters that structure global vocational education Research related to graduate employability, encompassing digital transformation, work-based learning, skills development, vocational policy and governance, and entrepreneurship. These clusters represent the dominant strategic areas addressed in the literature. Consistent with this structure, Figure 2 shows that the digital transformation and employability cluster has the largest nodes and the highest connectivity, indicating its central and dominant role within the global vocational education Research network.



**Figure 2.** Visualization Map of the Relationship Between Keywords in Vocational Education Research (Processed Using VOSviewer, 2025)

The visualisation shows that the keyword "vocational education" has the highest connectivity and serves as a key node in the network. Other keywords with strong connections include digital transformation, work-based learning, curriculum design, internships, and employability. Based on thematic analysis of the article's substance, this study identified five major themes as the main results of the SLR.

**Table 3.** Thematic Synthesis of Strategies to Improve the Employability of Vocational Graduates

No	Main Theme	Key Subthemes	Main Contributions
1	Digital Transformation in Vocational Learning	LMS, AI, online learning	Technology increases the flexibility and relevance of learning
2	Work-Based Learning & Dual System	Internship, dual system	Real work experience accelerates job readiness
3	Digital Literacy & Teacher Competence	Teacher competency, digital training	Teachers become key actors in digital transformation
4	Graduate Employability & Soft Skills	Soft skills, self-efficacy	Soft skills determine the success of a job transition
5	Technopreneurship & Career Development	Digital entrepreneurship	Entrepreneurship as an adaptive strategy

Table 3 summarises the thematic synthesis of strategies to improve the employability of vocational graduates derived from the systematic literature review. The table highlights key themes and subthemes, including digital transformation in vocational learning, work-based learning, teacher digital competence, soft skills development, and technopreneurship, which collectively represent the core strategic approaches identified in the literature.

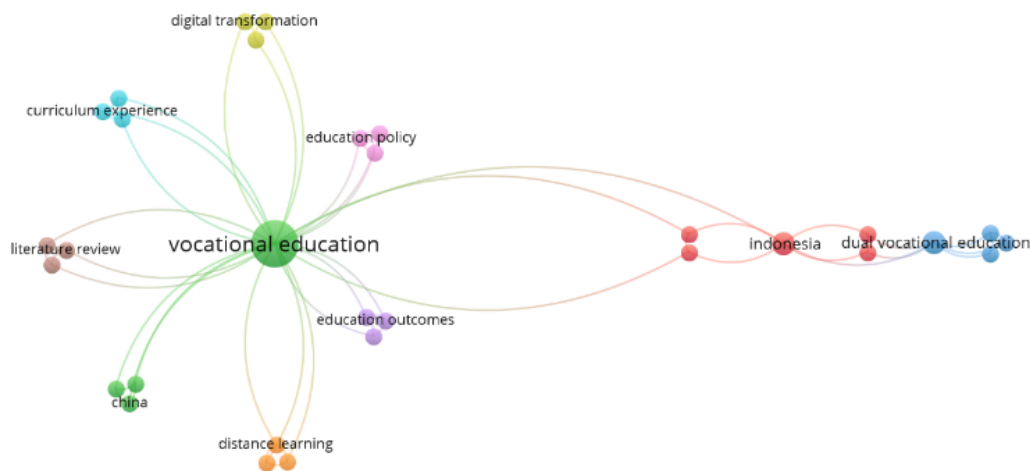
### Research Gap Related to Improving Graduate Competencies (RQ2)

Density visualization analysis reveals Research areas with low density, indicating Research gaps. Bibliometrically, themes with low link strength are dual system evaluation, teacher digital literacy, and technopreneurship.

**Table 4.** Research Gap in Vocational Education

No	Research Gap	Bibliometric Indications	Further Research Directions
1	Evaluation of the effectiveness of the dual system	Weak connection with learning outcomes	Graduate outcome-based evaluative study
2	Digital literacy of vocational teachers	Small nodes & low links	Teacher digital training intervention
3	Vocational technopreneurship	Not connected to Industry 4.0	Digital entrepreneurship curriculum
4	Cross-sector collaborative policy	Minimal connection to the policy industry	Triple helix governance model

Table 4 outlines the main Research gaps in vocational education identified through the bibliometric and thematic analyses. The table highlights underexplored areas, including the evaluation of dual systems, vocational teachers' digital literacy, the integration of technopreneurship, and cross-sector collaborative policies. It indicates key directions for future vocational education Research.



**Figure 3.** Network Analysis and Density Visualization

Figure 3 presents the network analysis and density visualization of vocational education Research, illustrating the intensity and distribution of Research themes within the keyword network. Areas with higher density indicate well-established and frequently studied topics, while lower-density areas reveal less explored themes that point to potential Research gaps for future investigation.

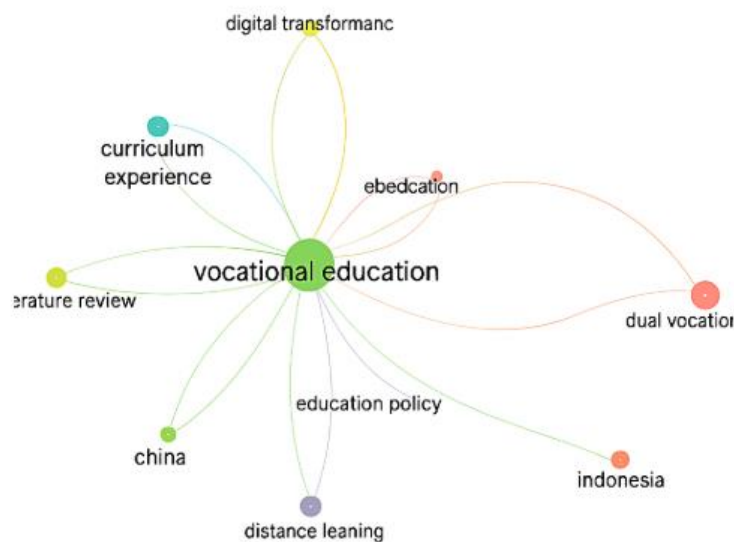
### Vocational Education Research Trends 2020-2025 (RQ3)

To address RQ3, this section examines the evolution of vocational education Research focus from 2020 to 2025 using an overlay visualization analysis. The analysis reveals shifts in dominant themes over time, reflecting changes in Research priorities in response to global challenges and technological developments. The detailed distribution of Research trends across periods is presented in Table 5.

**Table 5.** Vocational Education Research Trends Based on Overlay Visualisation

Period	Dominant Focus	Trend Interpretation
2020-2021	Curriculum reform, employability, skills mismatch	Initial focus on competency gaps
2022-2023	work-based learning, dual system, and distance learning	Response to the COVID-19 pandemic
2024 -2025	Digital transformation, entrepreneurship	AI, Accelerating digital vocational innovation

The overlay results show three main development patterns. The 2020-2021 period was dominated by curriculum reform and employability. The 2022-2023 period showed an increased focus on work-based learning and dual systems. The 2024-2025 period saw a shift in themes toward digital transformation, artificial intelligence in vocational education, and entrepreneurship. Figure 4 visualizes these shifts in focus.



**Figure 4.** Overlay Visualization, Vocational Education, and Research Trends

The integration of bibliometric analysis and SLR thematic synthesis demonstrates a strong alignment between the dominant Research themes and the substantive findings of the reviewed literature. Digital transformation and employability emerge as central nodes in the bibliometric network and as primary themes in the SLR results. At the same time, the identified Research gaps provide a foundation for future Research directions and policy considerations. Based on these findings, this study proposes a conceptual model for enhancing the employability of vocational graduates that integrates digital transformation of learning, work-based learning and dual systems, teacher digital competence, soft skills development, and technopreneurship. This integrated model offers a holistic framework for strengthening vocational graduate employability and can be further examined and validated through future empirical Research.

#### D. Discussion

This discussion interprets the findings of the Systematic Literature Review (SLR) and bibliometric analysis of 44 selected articles to address the three Research questions (RQ1–RQ3). Beyond describing the results, this section explains why particular Research patterns emerged and situates the findings within the broader context of international vocational education studies.

The bibliometric analysis reveals five main clusters in vocational education Research, with digital transformation, work-based learning, and employability emerging as the most dominant themes. The SLR thematic synthesis confirms that these clusters represent core strategic approaches for improving the quality and competitiveness of vocational education graduates worldwide. The prominence of digital transformation indicates that vocational education systems are undergoing a fundamental shift to respond to technological change and the demands of Industry 4.0. This finding aligns with [Antonietti et al \(2022\)](#) and [Wu \(2024\)](#), who argue that digital technology integration has become a prerequisite rather than an optional innovation for graduate job readiness. Bibliometric evidence further supports this argument, as keywords related to digital transformation and vocational education exhibit the largest node size and link strength, underscoring the central role of digitalization in contemporary vocational discourse.

In addition to digital transformation, work-based learning and dual systems occupy a strong position within the Research network. This pattern reflects the growing recognition that authentic workplace experiences are essential for bridging the gap between education and labour market demands. Previous studies by [Rintala & Nokelainen \(2020\)](#), [Barrera-Osorio et al \(2023\)](#), and [McGrath & Yamada \(2023\)](#) consistently demonstrate that internships, apprenticeships, and industry-based learning significantly enhance graduates' employability. The convergence of SLR and bibliometric findings in this study confirms that strengthening work-based learning remains a key pillar of high-quality vocational education.

Despite the dominance of these themes, the density visualisation analysis identifies several Research gaps, particularly in the evaluation of dual-system implementation,

vocational teachers' digital literacy, and technopreneurship. These gaps indicate that although such topics are frequently emphasized in policy discussions and conceptual frameworks, empirical and outcome-based studies remain limited. The limited number of evaluative studies on dual systems can be explained by the context-dependent nature of their implementation, which varies according to national regulations, industry readiness, and institutional capacity. Studies by [Gessler & Siemer \(2020\)](#) and [Wibowo et al \(2022\)](#) suggest that much of the existing Research remains descriptive and does not systematically assess outcomes such as graduate performance or employer satisfaction, resulting in weak connections within the bibliometric network.

Similarly, the scarcity of Research focusing on vocational teachers' digital literacy highlights persistent structural challenges in educator capacity development. Although digital competence is widely acknowledged as a critical factor in vocational education transformation, empirical Research has tended to prioritize students rather than teachers. This finding is consistent with [Habibi et al \(2023\)](#) and [Hofmeister & Pilz \(2020\)](#), who emphasize that gaps in teachers' digital competencies constitute a major barrier to the effective implementation of digital learning in vocational contexts.

The analysis of Research trends from 2020 to 2025 further illustrates the dynamic evolution of vocational education Research. During the 2020–2021 period, studies primarily focused on skills mismatch and curriculum reform, reflecting early responses to misalignment between graduate competencies and labour market needs. In the 2022–2023 period, attention shifted toward work-based learning and distance learning, largely driven by the COVID-19 pandemic. International evidence from [Syauqi et al \(2020\)](#) and [Yeap et al \(2021\)](#) confirms that the pandemic accelerated the adoption of flexible learning modalities and stimulated pedagogical innovation in vocational education. In the most recent period (2024–2025), Research increasingly emphasizes digital transformation, artificial intelligence, and entrepreneurship, indicating a shift from remediation of skill gaps toward innovation, value creation, and future-oriented vocational development ([McGrath & Yamada, 2023](#); [Triyono et al., 2023](#)).

The integration of SLR findings and bibliometric analysis demonstrates strong consistency between the structural patterns of the Research network and the substantive themes identified in the literature. Dominant bibliometric nodes, such as digital transformation and employability, are also the central themes emerging from the SLR synthesis. Conversely, themes with low density in the bibliometric maps closely align with the Research gaps identified through qualitative analysis. This convergence confirms that combining bibliometric analysis with SLR provides a more comprehensive understanding of vocational education Research by revealing both well-established areas and neglected topics requiring further investigation.

Overall, this discussion highlights that the interaction between technological innovation, work-based learning, educator capacity, and entrepreneurial orientation shapes the transformation of vocational education. These findings reinforce the argument that improving vocational graduate quality cannot be achieved through isolated interventions

but requires a systemic and collaborative approach. Consequently, this study not only addresses the Research questions but also provides a conceptual foundation for developing vocational education models that are adaptive to technological change and responsive to the evolving demands of the global labour market.

## **E. Implication**

The findings of this study have important implications for the development of vocational education theory, practice, and policy to enhance graduates' work-readiness and global competitiveness. By synthesizing evidence from a Systematic Literature Review and bibliometric analysis, this study offers a comprehensive perspective on how vocational education systems can respond more effectively to the demands of Industry 4.0 and an increasingly competitive global labour market.

From a theoretical perspective, the results strengthen and expand the conceptual framework of vocational education by demonstrating that graduate employability cannot be explained through a single dimension. Instead, employability emerges from the integration of digital readiness, work-based learning (WBL), and vocational education governance. The combined SLR and bibliometric findings reveal that digital competencies, authentic workplace learning experiences, and supportive institutional policies interact to form a vocational learning ecosystem that is adaptive to technological change and the rise of artificial intelligence. This study therefore contributes to vocational education theory by proposing an integrative model that conceptualises employability as a systemic outcome shaped by learning technology, workplace engagement, and governance structures, thereby enriching the literature with a more holistic, interconnected perspective.

In practical terms, the findings offer strategic guidance to vocational education institutions for designing and implementing learning programs to improve graduate employability. First, strengthening teachers' digital literacy and competence is a critical prerequisite for successful vocational education transformation, as educators function not only as learning facilitators but also as key agents of change in integrating technology with innovative pedagogy. Second, the results highlight the need to strengthen work-based learning and internship or dual systems through more structured and sustainable partnerships with industry. Empirical evidence indicates that authentic workplace experience significantly enhances graduates' technical skills and soft skills, supporting smoother transitions into employment. Third, vocational institutions are encouraged to systematically integrate soft skills development, entrepreneurship, and career-readiness into their curricula better to prepare graduates for a dynamic, uncertain labour market.

From a policy perspective, this study emphasises the importance of a collaborative triple helix approach among government, educational institutions, and industry to advance vocational education. Policymakers are encouraged to formulate regulations that not only promote digitalization in education but also ensure strong alignment between vocational curricula and the evolving needs of technology-driven industries. In addition, vocational education policies should prioritise strengthening national internship systems,

standardising educators' digital competencies, and providing incentives for industries that actively engage in work-based learning initiatives. An adaptive, collaborative, and accountable governance framework is therefore essential to enhancing vocational graduates' global competitiveness while supporting sustainable human resource development.

## **F. Limitation and Suggestion for Further Research**

This study has several limitations that should be considered when interpreting the findings. First, the review was limited to articles indexed in Scopus and SINTA 1-2 published between 2020 and 2025, potentially excluding relevant studies from other databases, grey literature, policy reports, and non-indexed sources. Second, the bibliometric analysis depended on selected keywords and search strings; variations in terminology and regional contexts may have led to the omission of some relevant publications, potentially introducing selection bias. Third, as this study employed a Systematic Literature Review without direct empirical investigation, the findings represent a synthesis of existing Research and cannot explain causal relationships or the detailed contextual implementation. In addition, the absence of quantitative meta-analysis limits the ability to estimate the effect sizes of identified strategies. Finally, the bibliometric analysis relied on a single visualisation tool (VOSviewer) and did not employ triangulation with other bibliometric techniques. Given these limitations, future Research is recommended to expand data sources, incorporate empirical and mixed-methods approaches to validate key strategies such as work-based learning and digital transformation, and focus on standardised measurement of vocational teachers' and students' digital competencies. Longitudinal and meta-analytic studies are also needed to assess the long-term and comparative impacts of vocational education interventions on graduate employability.

## **G. Conclusion**

This study synthesizes evidence from a Systematic Literature Review and a bibliometric analysis of 44 articles indexed in Scopus and SINTA 1-2, published between 2020 and 2025, to examine strategies for enhancing the employability of vocational education graduates. The findings reveal that vocational education Research is structured around five dominant thematic clusters: digital transformation of learning, work-based learning and dual systems, skills development and graduate employability, vocational education policy and governance, and entrepreneurship and career development. Among these, digital transformation and employability emerge as the most central and interconnected themes, indicating their pivotal role in preparing graduates for the demands of Industry 4.0 and the global labour market.

The study also identifies key Research gaps, particularly in the evaluation of dual-system implementation, vocational teachers' digital competence, the integration of technopreneurship, and cross-sector collaborative governance. These gaps suggest a need to shift future Research from predominantly descriptive approaches toward more outcome-

based and evaluative studies. Trend analysis further indicates a clear evolution in vocational education Research, moving from curriculum reform and skills mismatch issues toward digital innovation, artificial intelligence, and entrepreneurial orientation in recent years.

Overall, the findings confirm that improving vocational graduate employability requires an integrated and systemic approach that combines digital transformation, authentic work-based learning, educator capacity development, and adaptive governance. By providing a comprehensive synthesis of Research themes, gaps, and trends, this study contributes an integrative conceptual perspective. It offers evidence-based insights to support the development of responsive vocational education systems aligned with technological change and global workforce demands.

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