Mapping the Scientific Landscape of Employability and Work Experience in TVET and Higher Education: A Bibliometric Analysis (2010–2025)

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Abstract

Rapid shifts in labour market demands have intensified the need for graduates who combine technical competence with adaptability, confidence, and practical skills. In Technical and Vocational Education and Training (TVET) and higher education, embedding work experience is increasingly viewed as essential to producing work-ready graduates. Mapping the evolution and theoretical foundations of this scholarship is vital to guiding policy, curriculum reform, and research collaboration. This study maps the scientific landscape of employability and work experience in TVET and higher education through a bibliometric analysis (2010–2025), identifying publication trends, leading contributors, thematic clusters, and theoretical pillars, while highlighting gaps for future inquiry. Data from Scopus were retrieved via a structured Boolean search, cleaned, and analysed using VOSviewer and Bibliometrix. Analyses covered trends, collaboration networks, keyword co-occurrence, and citation/co-citation patterns. Scholarly output has expanded significantly, with a sharp rise post-2019 driven by global skills and policy agendas. Seven thematic clusters emerged, focusing on skill development, work-integrated learning, curriculum reform, and labour market readiness. Co-citation analysis identified Human Capital Theory, Social Cognitive Theory, and Experiential Learning Theory as dominant yet rarely integrated frameworks. The study advances the field by introducing the Integrated Employability–Work Experience Development (IEWED) Model, which unifies the three theoretical pillars in a framework linking skills acquisition, learner agency, and experiential learning within a structural and policy environment. Incorporating measurable indicators, the model provides a practical roadmap for aligning educational provision with evolving labour market needs.

Keywords: Employability, Work experience, Technical and Vocational Education and Training (TVET), Higher education, Work-integrated learning.

1.   Introduction

In the face of increasing globalisation, rapid technological advancement, and fluctuating economic conditions, the contemporary labour market has become highly dynamic and

intensely competitive. Within this evolving landscape, employability has emerged as a fundamental concern across multiple stakeholders, including educators striving to equip students with relevant competencies, policymakers designing education and workforce strategies, and researchers attempting to understand the determinants of successful transitions into the world of work. Employability is a collection of achievements that encompasses skills, understandings, and personal attributes (Mustapha, 2015). It enhances an individual's capacity to secure and sustain employment as well as to navigate complex and changing occupational trajectories (Idris et al., 2014).

The components of employability are multifaceted and extend beyond technical knowledge. They include a wide spectrum of both cognitive and non-cognitive skills such as critical thinking, adaptability, effective communication, collaboration, and self-efficacy, all of which are increasingly demanded by employers across sectors (Aliyu & Ewugi, 2015). However, academic preparation alone has proven insufficient in producing graduates who are fully equipped for contemporary workplace realities. The cultivation of employability, therefore, demands not only classroom learning but also active engagement in practical work experience encompassing internships, industrial attachments, and apprenticeships that serve as a critical bridge between education and employment (Nurjanah & Ana, 2022; Otache & Edopkolor, 2022).

Work experience plays an indispensable role in reinforcing students' learning outcomes by embedding them within authentic work contexts. It facilitates the contextualisation and application of theoretical knowledge, fosters the development of soft skills, instils professional confidence, and enhances overall job readiness (Dantas & Cunha, 2020). More importantly, exposure to real-world environments through structured experiential learning opportunities allows students to internalise industry expectations, understand organisational cultures, and refine competencies that are seldom acquired within traditional academic settings (Gadola et al., 2019).

Recognising these benefits, institutions within the Technical and Vocational Education and Training (TVET) sector and higher education systems globally have begun to prioritise the integration of work-based learning strategies into their curricular frameworks. TVET, by design, emphasises skill acquisition, occupational training, and hands-on learning, making it particularly amenable to experiential models (Halik & Mohd Noor, 2023). Yet, even within universities and other higher education institutions, there is growing awareness of the imperative to prepare students not just for academic achievement but for real-world employability (Okolie et al., 2020). Despite these advancements, the disconnection between educational outcomes and labour market demands persists in many regions as a challenge frequently attributed to inadequate work experience opportunities, outdated curricula, and a lack of alignment between institutional training and employer expectations (Abdulkadir & Mustapha, 2019).

Although a growing body of empirical studies has investigated employability and work experience within both TVET and higher education contexts, much of this literature remains fragmented across disciplines, regions, and methodological approaches. Existing research often

focuses narrowly on specific competencies, single-country case studies, or discipline-specific interventions, limiting the ability to draw broad insights about global research trends, dominant theories, and collaboration patterns. Moreover, the cumulative knowledge of how employability and work experience intersect within the wider educational landscape lacks a cohesive and synthesised perspective that cuts across diverse geographies and scholarly contributions (Abu-Shawish et al., 2021).

The current state of the literature underscores the necessity for a bibliometric analysis. This structured, data-driven method enables the mapping and evaluation of research outputs over time. Bibliometric analysis serves as a powerful tool for identifying influential authors, journals, institutions, and citation networks, while also revealing emerging trends, thematic concentrations, and collaborative relationships within a field of study. Applying this method to the domain of employability and work experience, particularly within the TVET and higher education sectors, holds immense value in revealing the intellectual structure of the research landscape, clarifying its evolution, and guiding strategic priorities for future inquiry.

This study, therefore, undertakes a comprehensive bibliometric analysis of global scholarly output from 2010 to 2025, focusing specifically on the intersection of employability, work experience, TVET, and higher education. The aim is to map the scientific landscape of this critical area, identify dominant knowledge clusters, and expose potential gaps that hinder the alignment of educational outcomes with labour market needs. Such an endeavour is timely and necessary, given the ongoing challenges of graduate unemployment, skill mismatches, and the urgent need for policy reforms that strengthen the education-to-employment pipeline. Insights drawn from this analysis will not only advance theoretical understanding but also inform evidence-based practices and policy decisions that can enhance the employability of graduates in both vocational and academic education systems.

2.   Methodology

2.1. Data Source

Bibliometric data were retrieved from the Scopus database due to its extensive coverage of peer-reviewed literature and rich metadata. Web of Science (WoS) was considered for cross-validation but was not used in the primary analysis.

2.2. Search Strategy

A structured Boolean search string was employed to identify relevant publications: ("employability" OR "graduate employability") AND ("work experience" OR "internship" OR "industrial training" OR "SIWES") AND ("TVET" OR "technical education" OR "polytechnic"). This query targeted peer-reviewed articles published between January 2010 and June 2025. The result yielded 318 articles.

2.3. Data Cleaning

Exported records in CSV and BibTeX formats were cleaned to remove duplicates, standardise author names, consolidate institutional affiliations, and harmonise keywords. Tools employed included VOSviewer for visualisation, and the Bibliometrix R package via the Biblioshiny interface for descriptive and network analyses.

2.4. Analytical Techniques

The scientific landscape of employability and work experience in TVET and higher education from 2010 to 2025 was examined using a comprehensive set of bibliometric procedures. The analysis began with the assessment of annual publication trends over the 15-year period, which revealed patterns of scholarly growth and interest. Key contributors to the field were identified, including leading authors, influential journals, prominent institutions, and active countries, highlighting the main drivers of research. Keyword co-occurrence mapping provided insight into dominant themes and emerging research areas within the literature. Citation, co-citation, and bibliographic coupling analyses were employed to explore the intellectual structure and interconnections among academic works. Collaboration network mapping across countries and institutions further illustrated the global nature of research efforts and the institutional partnerships influencing discourse in this domain.

3.   Results

3.1. Annual Publication Trends

The volume of research output addressing employability and work experience in the context of TVET and higher education has steadily increased over the review period. Between 2010 and 2025, scientific output on employability and work experience in TVET and higher education has shown a steady and significant rise, indicating increasing scholarly engagement with the subject. Publication activity was relatively modest from 2010 to 2012, with fewer than five outputs annually, before experiencing a gradual increase in 2013 and 2014. The period from 2015 to 2018 recorded a consistent pace, averaging around nine publications per year, followed by a notable surge from 2019. This growth became more pronounced from 2020 onwards, with annual outputs more than doubling compared to the earlier years, reaching a peak of 68 publications in 2024. The slight decline to 38 publications in 2025 likely reflects incomplete data for the year rather than a downturn in research productivity. This progression demonstrates a sustained intensification of research interest, driven by shifting labour market demands, targeted policy interventions, and the global imperative to strengthen skills development within the 21st-century workforce. Figure 1 shows the annual publication trends.
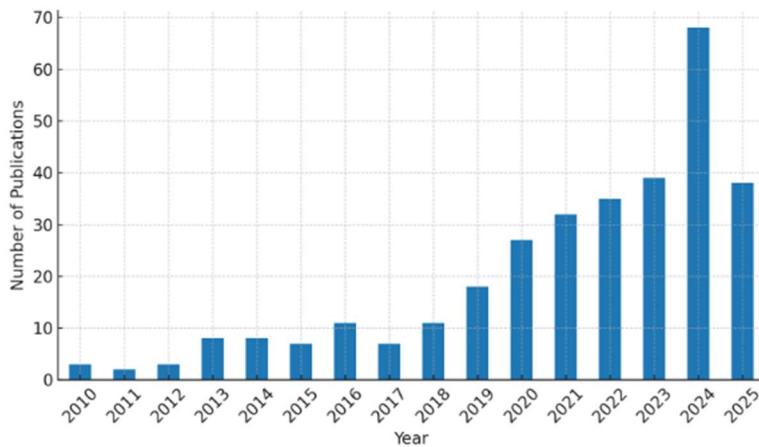
Figure 1: Annual Publication Trends

3.2. Influential Journals

The top journals by publication volume and citation impact include. The analysis identifies the most influential journals in the field of employability and work experience in TVET and higher education between 2010 and 2025. The *Higher Education, Skills and Work-based Learning* journal ranks highest, with 20 publications, followed by the *Journal of Technical Education and Training* with 13 and *Education and Training* with 11. Other prominent outlets include *Industry and Higher Education* (10) and *Sustainability (Switzerland)* (6). Several journals, such as *Cogent Education*, *Journal of Hospitality, Leisure, Sport and Tourism Education*, *World Transactions on Engineering and Technology Education*, and *International Journal of Management Education*, also feature prominently, each contributing between three and four publications. These journals serve as key platforms for disseminating research and shaping discourse in the field. These journals serve as primary outlets for scholarly discourse in this area, consistently publishing empirical and conceptual work related to employability development, curriculum design, and work-based learning. Figure 2 shows the top influential journals.

Result

	Journal	Publications
0	Higher Education, Skills and Work-based Learning	20
1	Journal of Technical Education and Training	13
2	Education and Training	11
3	Industry and Higher Education	10
4	Sustainability (Switzerland)	6
5	Cogent Education	4
6	Journal of Hospitality, Leisure, Sport and Tou...	3
7	World Transactions on Engineering and Technolo...	3
8	Journal of Hospitality and Tourism Education	3
9	International Journal of Management Education	3
10	Journal of Teaching and Learning for Graduate ...	3
11	Encyclopedia of Africa: Volume 11: (11 Volume ...	3
12	International Journal of Services and Operatio...	3
13	ASEE Annual Conference and Exposition, Confere...	3
14	Asian Journal of University Education	3

Figure 2: Top Influential Journals

3.3. Co-authorship analysis

Applying a co-authorship analysis with a maximum of 25 authors per document and a minimum threshold of three publications per author revealed that, among the 905 identified authors, only nine met the set criteria. For each of these nine authors, the total strength of co-authorship links with other authors was calculated, and the author with the highest total link strength within each cluster was identified. The network comprised nine items grouped into six clusters: Cluster 1 contained three authors, Cluster 2 included two authors, while Clusters 3 to 6 each consisted of a single author, indicating both concentrated and isolated collaboration patterns. Notable contributors within the co-authorship network include Aigbavboa, Clinton (South Africa), whose work encompasses sustainable construction, skills development, and work-readiness, with a total link strength of 5; Ebekozien, Andrew (Nigeria), specialising in construction management, vocational training, and employability, also with a total link strength of 5. Aliu, John (Nigeria), recognised for his contributions to educational development and workforce skills, with a total link strength of 4. Other influential figures are Chadha, Suresh Kumar (India), engaged in higher education reforms and graduate employability, with a total link strength of 3, and Joshi, Pradeep (India), whose research addresses TVET pedagogy and industry linkages, likewise with a total link strength of 3. These authors represent central actors in advancing scholarship on employability and work experience in TVET and higher education, each bringing distinct thematic expertise to the field. These authors exhibit notable collaborative engagement, with some positioned at the core of interconnected research networks and others maintaining more specialised, independent contributions to the scientific landscape of employability and work experience in TVET and higher education. Figure 3 shows the co-authorship analysis.

Figure 3: Co-authorship analysis

3.4 Keyword Co-occurrence Analysis and Thematic Clusters

A keyword co-occurrence analysis, limited to a maximum of five occurrences per keyword, revealed that out of 988 identified keywords, only 32 met the set threshold. For each of these 32 keywords, the total strength of co-occurrence links with other keywords was calculated, and the keyword with the highest total link strength in each cluster was identified. The resulting network comprised 32 items organised into seven clusters, representing distinct yet interconnected thematic areas within the research domain as follows:

1. **Cluster 1**: Employability, skills development, competencies, soft skills, self-efficacy
2. **Cluster 2**: Work experience, internship, industrial training, student industrial work experience scheme (SIWES)
3. **Cluster 3**: Higher education, TVET, technical education, polytechnic education
4. **Cluster 4**: Curriculum reform, work-integrated learning, industry collaboration, practical training
5. **Cluster 5**: Graduate unemployment, labour market, skill mismatch, job readiness
6. **Cluster 6**: Lifelong learning, professional development, continuing education, workplace learning
7. **Cluster 7**: Policy, educational reform, workforce development, sustainable employment.

These clusters illustrate the linkage between academic skill development and industry engagement, underscoring the growing recognition of experiential learning as a critical component of workforce readiness. This structure highlights the conceptual breadth of scholarship on employability and work experience in TVET and higher education, with clusters representing focal themes such as skills development, industry collaboration, curriculum design, and graduate readiness, as well as cross-cutting issues like policy frameworks and labour market integration. Figure 4 shows the keyword co-occurrence analysis.
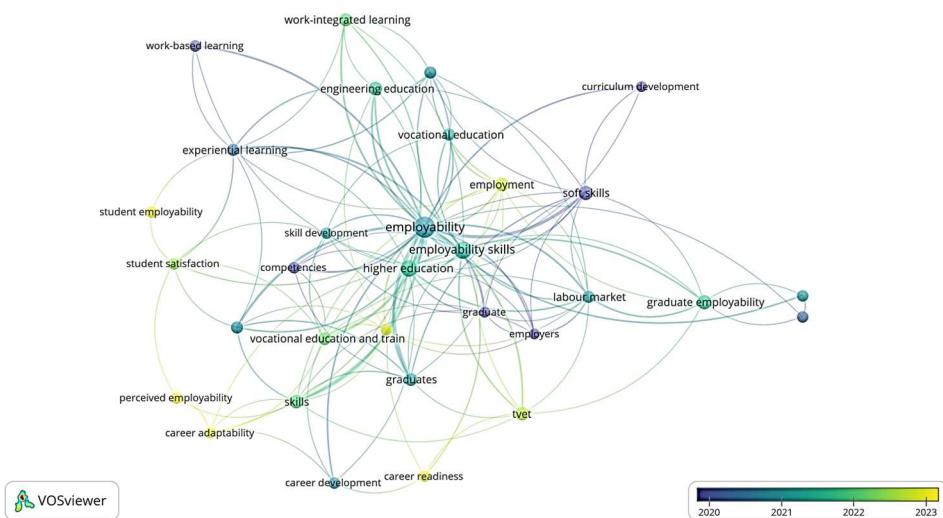
Figure 4: Keyword Co-occurrence Analysis

3.5. Country and Institutional Output

The leading countries by publication volume are Malaysia, India, South Africa, Indonesia, and Nigeria. Regionally, Asia's dominance reflects a strong policy focus on aligning TVET and higher education with industrial growth. At the same time, Sub-Saharan Africa's outputs, led by South Africa and Nigeria, emphasise skills development as a pathway to socio-economic transformation. European contributions, notably from the United Kingdom, Portugal, and Spain, focus on lifelong learning, work-integrated models, and mobility. Bibliometric indicators show Malaysia and South Africa as central nodes in international co-authorship networks, European publications with higher average citation impact, and African outputs distinguished by strong policy relevance despite lower citation counts. In Sub-Saharan Africa, Nigeria stands out for its substantial contributions to the employability discourse. Leading

institutions include the University of Nigeria, Nsukka, Universiti Tun Hussein Onn Malaysia, and the University of Johannesburg, reflecting both geographical diversity and institutional commitment to research in this field. Figure 5 shows the word cloud for the leading countries.

Figure 5: Word Cloud Leading Countries

3.6. Citation and Co-citation Analysis

The analysis shows that highly cited works in the field address diverse employability themes, from regional and contextual insights to discipline-specific skill needs. Key contributions highlight employability in Africa, service quality in business education, and stakeholder perspectives on craftsmanship in higher education. Studies emphasise the importance of work-integrated learning, institutional support for school-to-work transitions, and core professional skills for graduates. Methodological advances include developing an employability skills model using structural equation modelling. Other research explores university–industry linkages, integrates experiential learning with social cognitive career theory, and examines structural determinants of graduate employability. Collectively, these works reflect the multidimensional nature of employability research, blending theoretical, contextual, and applied perspectives. Co-citation analysis revealed strong conceptual linkages among *Human Capital Theory, Social Cognitive Theory, and Experiential Learning Theory*, underscoring their foundational influence in shaping both theoretical frameworks and empirical research. These interconnections suggest that employability scholarship in TVET and higher education is anchored in multidimensional perspectives that integrate skills acquisition, self-efficacy, and experiential learning as critical levers for graduate readiness in the labour market. Table 1 shows the citation frequency, focus area, and theoretical underpinnings of highly cited studies in employability research.

Table 1: Citation Frequency, Focus Area, and Theoretical Underpinnings of Highly Cited Studies in Employability Research

S/N	Authors (Year)	Citation Frequency	Focus Area	Theoretical Underpinning
1	Joshi & Chadha (2016)	4	Service quality perception in business education	Service Quality Theory/ Human Capital Theory
2	Ebekozien et al. (2023)	4	Craftsmanship in built environment education	Experiential Learning Theory
3	Okolie (2022)	3	Work placement, employability, supervisor support	Social Cognitive Theory/ Experiential Learning Theory
4	Donald (2024)	3	University-employer collaboration	Human Capital Theory
5	Aliu et al. (2023)	3	Discipline-specific employability skills	Human Capital Theory
6	Aliu et al. (2025)	2	Employability skills model (PLS-SEM)	Human Capital Theory/ Skills Development Models
7	Chukwuedo et al. (2023)	2	University-industry linkage in technical education	Human Capital Theory/ Social Cognitive Theory
8	Chukwuedo & Ementa, (2022)	2	Work placement and employability nexus	Experiential Learning Theory/ Social Cognitive Theory
9	Aliu & Aigbavboa, (2020)	2	Structural determinants of graduate employability	Human Capital Theory

4.   Discussion and Limitations

The bibliometric results indicate that research on employability and work experience in TVET and higher education has moved from predominantly descriptive accounts of skill gaps toward more theory-driven, multidimensional investigations. This shift is consistent with the long-standing view that investment in education generates individual and societal returns, the core claim of Human Capital Theory, which frames much of the work on curriculum alignment and discipline-specific skills (Noah & Abdul Aziz, 2020). The prominence of keywords and clusters related to internships, SIWES, and work-integrated learning reflects the influence of Experiential Learning perspectives that emphasise learning through concrete experience and reflective practice (Cherian & Practice, 2022). Likewise, the recurrent presence of constructs such as self-efficacy, mentorship, and career agency across the data aligns with Social

Cognitive Theory, which situates individual beliefs and observational learning as mediators between learning opportunities and occupational outcomes (Sharma, 2023).

Methodologically, the use of bibliometric mapping (co-citation, keyword co-occurrence, co-authorship networks) is well matched to the study's aims: these methods illuminate intellectual structure, thematic clustering, and collaboration patterns in ways that traditional literature reviews cannot (Nguyen & Nguyen, 2025). The finding of rising output since 2019 and concentration of influential outlets (for example, Higher Education, Skills and Work-based Learning) is consistent with global policy and labour-market pressures that intensified interest in competency-based and work-integrated approaches during and after the pandemic era.

However, several critical observations emerge from the results. First, although volume has increased, the citation-impact asymmetry (higher citation impact for some European outlets versus growing but lower-impact African outputs) suggests persistent visibility and quality differentials that may reflect resource, language, and network barriers, issues noted in meta-analyses of global education research. Second, the co-authorship network shows fragmentation: relatively few authors occupy central bridging positions, while many contributions remain locally clustered. This fragmentation limits cross-regional knowledge exchange and reduces opportunities for comparative and longitudinal designs that could strengthen causal inference about educational interventions. Third, the three dominant theories (Human Capital, Social Cognitive, Experiential Learning) repeatedly feature across the co-citation maps, few studies empirically integrate them into a single, testable model; most apply one framework in isolation. That theoretical siloing constrains the capacity to explain how curriculum inputs, individual agency, and hands-on experience interact to produce employability outcomes.

These gaps point to the need for a parsimonious but integrative conceptual apparatus that can guide both empirical work and policy. The proposed Integrated Employability–Work Experience Development (IEWED) Model addresses this need by explicitly linking (a) curriculum and skills provisioning (human capital), (b) learner agency and self-efficacy (social cognitive), and (c) applied practice and reflection (experiential learning), all embedded within institutional and policy contexts that moderate access and outcomes. An integrative model would allow researchers to test mediated and moderated pathways (for example, whether work placements increase self-efficacy, which in turn amplifies the labour-market returns of technical training), thereby moving beyond descriptive bibliometrics to programmatic causal research.

Finally, from a methodological standpoint, the study's use of bibliometric software and network metrics is appropriate. However, future work could strengthen validity by (i) triangulating across multiple databases (Scopus + Web of Science + regional indices), (ii) including altmetric indicators to capture non-scholarly impacts, and (iii) coupling bibliometrics with systematic mapping or meta-analysis for substantive effect estimates. Doing so would better position the field to inform policy and curriculum design with both breadth (mapping) and depth (effect sizes, causal pathways).

4.1. Proposed Integrated Employability–Work Experience Development (IEWED) Model

The IEWED Model underscores the pressing need to address persistent gaps between educational outputs and labour market demands in TVET and higher education. Integrating Knowledge & Skills Acquisition (Human Capital Theory), Agency & Self-Efficacy (Social Cognitive Theory), and Experiential Learning & Contextual Application (Experiential Learning Theory) within a Structural & Policy Environment, the model responds to evidence from the bibliometric analysis that existing research often treats these domains in isolation. The sequential and cross-linked pathways demonstrate how skills provision enhances learner agency, which in turn facilitates engagement in real-world practice, leading to tangible employment outcomes. Feedback loops from these outcomes inform continuous curriculum improvement, strengthen learner confidence, and optimise training design. The explicit inclusion of measurement indicators tied to each component not only enables systematic evaluation but also provides a replicable framework for aligning education with industry needs. This contribution advances the field by offering a unified, theory-driven structure that bridges conceptual gaps and guides both empirical research and policy reforms aimed at improving graduate employability. Figure 6 shows the proposed integrated employability-work– work experience development (IEWED) model.
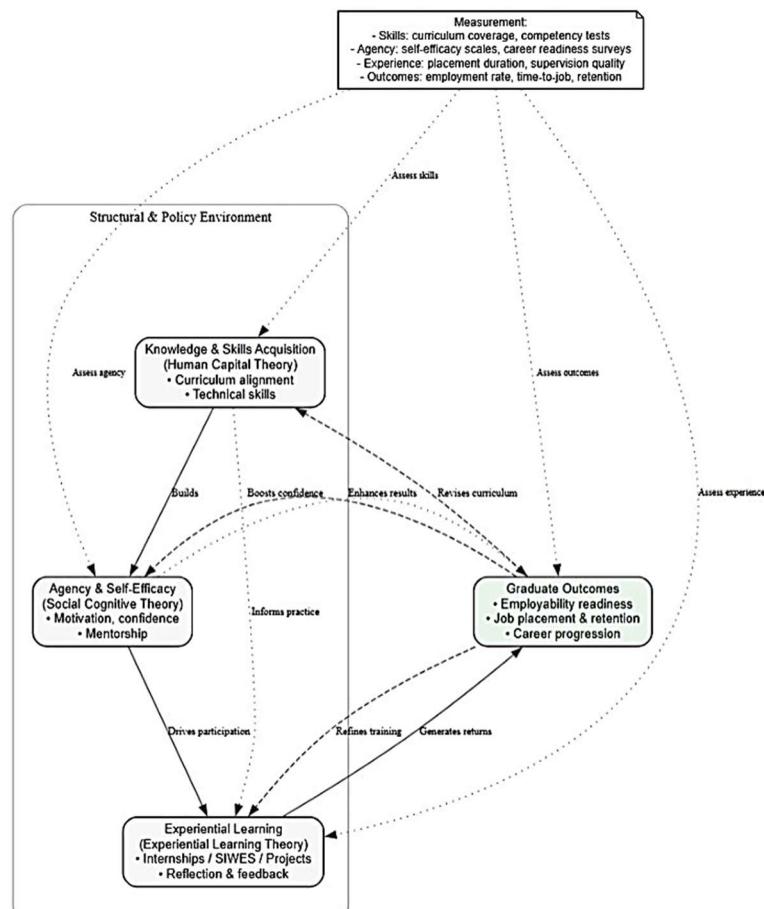
Figure 6: Proposed Integrated Employability–Work Experience Development (IEWED) Model

The findings of this study carry important implications for multiple stakeholders. For researchers, the identification of key authors, influential journals, and leading institutions provides a foundation for networking and fostering collaborative inquiry, while also highlighting the need for comparative analyses across regions and the exploration of emerging constructs such as digital employability. For policymakers, the evidence supports the development and reinforcement of national strategies that promote structured internships, Student Industrial Work Experience Scheme (SIWES) programmes, and robust public–private partnerships as mechanisms for bridging the gap between education and employment. For educators, the results underscore the urgency of curriculum reforms that embed experiential learning and integrate competency-based assessment frameworks, ensuring that graduates are better prepared to meet dynamic labour market demands and achieve sustainable career outcomes.

5.　　　Conclusions and Future Work

This bibliometric analysis offers a systematic mapping of global research on employability and work experience in Technical and Vocational Education and Training (TVET) and higher education from 2010 to 2025, revealing both the breadth and evolution of scholarly engagement in the field. The results show a clear upward trajectory in publication output, concentrated contributions from influential authors and institutions, and thematic clusters emphasising skills acquisition, work-integrated learning, policy frameworks, and labour market alignment. The co-citation analysis confirmed that Human Capital Theory, Social Cognitive Theory, and Experiential Learning Theory serve as the foundational pillars of the research domain. However, the fragmentation of collaboration networks, geographical imbalances in citation impact, and the limited integration of these theories into a unified explanatory framework highlight critical gaps. The proposed Integrated Employability–Work Experience Development (IEWED) Model addresses these shortcomings by linking curriculum design, learner agency, and experiential practice within a supportive structural and policy environment. This model not only advances theoretical synthesis but also provides a practical roadmap for aligning educational outcomes with labour market demands. Moving forward, research should adopt more integrative, comparative, and longitudinal approaches while expanding coverage to underrepresented regions, ensuring that the knowledge base reflects a truly global perspective on graduate employability.

Conflict of Interest

The authors have no conflict of interest.

Author Contributions

Yalwa Alhaji Tukura: Conceptualization, Methodology, Data curation, Formal analysis, Investigation, Visualization, Writing – original draft. **George Chabya Gania:** Validation,

Writing – review & editing, Theoretical framing. **Nasir Muhammad Nasira:** Data curation, Software, Bibliometric analysis, Visualization, Writing – review & editing.

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Ethical Statements

This study did not involve human participants, animals, or sensitive personal data; therefore, no ethical approval was required.

Data and Code Availability

The data analysed in this study were retrieved from the Scopus database using a structured Boolean search. All processed datasets and the code used for bibliometric analysis (including VOSviewer and Bibliometrix scripts) are available from the corresponding author upon reasonable request.

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