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Knowledge of Career Opportunities across Academic Disciplines: A Systematic Literature Review

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ABSTRACT

This study was conducted to systematically review and synthesise existing literature on students' knowledge of career opportunities across various academic disciplines and their relationship to employability skills and industry needs. Using a Systematic Literature Review (SLR) approach based on PRISMA 2020 guidelines, a total of 25 reference articles were analysed, obtained from Scopus, Web of Science (WoS) and Google Scholar databases. The search strategy involved the use of keywords such as career opportunities, employability skills, academic disciplines and TVET. The results of the thematic synthesis identified three main focuses, namely the level of students' knowledge of career opportunities, factors influencing their awareness, and the gap between graduates' skills and industry demands. The findings indicate that the effectiveness of the curriculum, the integration of educational technologies such as artificial intelligence (AI), virtual reality (VR) and micro-qualifications, and the implementation of Work-Integrated Learning (WIL) are important elements that can improve students' readiness to face the global job market. This study provides theoretical and practical contributions by proposing a model of collaboration between academic institutions, industry and government to strengthen the marketability of graduates, bridge the skills gap, and ensure that students are better prepared to face the challenges of the 4th Industrial Revolution and the 21st century job market.

1. INTRODUCTION

The Industrial Revolution 4.0 has brought about major changes in the global employment structure, requiring graduates to have clear career knowledge and marketable skills across multiple disciplines. Although higher education institutions play a role in providing career information, studies show that student awareness levels are still low and inconsistent (Eimer & Bohndick, 2023; Martins et al., 2023). Students often rely on limited information sources, resulting in less strategic career planning and affecting their employability (Hidayah et al., 2022). The gap between graduates' skills and industry needs also persists, particularly in digital literacy, communication, problem-solving and technological adaptability (Kamaruddin et al., 2023; Tushar & Sooraksa, 2023). However, curricula in many institutions still do not emphasize the development of comprehensive soft and technical skills, leaving graduates underprepared (Tran & Nguyen, 2023; Sultana & Tynjälä, 2024). The effectiveness of work-integrated learning (WIL)

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and industrial training programs also influence career knowledge, but their implementation varies by institution (Luk & Chan, 2024). New technologies such as artificial intelligence, virtual reality and micro-qualifications have the potential to improve student readiness, but their application is still limited (Bond et al., 2024; Varadarajan et al., 2023). Therefore, this study synthesises 25 articles to assess the level of students' knowledge about career opportunities and the factors that influence this awareness, thus contributing to the government, community, institutions and industry in their efforts to improve the marketability of graduates in the digital era.

2. LITERATURE REVIEW

The global job market of the Industrial Revolution 4.0 era demands graduates to have broad and cross-disciplinary career knowledge as it influences marketability and career path planning in the 21st century (Eimer & Bohndick, 2023; Martins et al., 2023). Although digital platforms provide access to information, the literature shows that the level of student knowledge still varies by field and depends on the approach of the academic institution (Villegas, 2024; Hidayah et al., 2022). Therefore, this study synthesises 25 articles in Table 1 and analyses them according to the themes in Table 2.

Table 1. Summary of Included Studies (n=25)

No	Authors	Year	Article Title	Key Findings
1	Eimer & Bohndick	2023	Employability models for higher education: A systematic literature review and analysis	Synthesises employability models and proposes a taxonomy highlighting reflection and WIL as key levers.
2	Tripney et al.	2013	TVET interventions to improve employability and employment of young people in LMICs: a systematic review & meta-analysis	TVET programmes improve employment and skill outcomes; impact varies by context and programme quality.
3	Scandurra et al.	2024	Do employability programmes in higher education improve skills and labour market outcomes? A systematic review	Mixed results: skill improvements are common; long-term job effects remain inconclusive.
4	Abelha et al.	2020	Graduate Employability and Competence Development in Higher Education—A Systematic Literature Review	HEIs foster employability via transversal skills, WIL, and strong curriculum–industry alignment.
5	Williams et al.	2016	A systematic review of current understandings of employability	Employability is multidimensional but lacks consistent measurement; highlights need for integrated models.
6	Varadarajan et al.	2023	The potential of micro-credentials in higher education: Opportunities, challenges, and implications for employability	Micro-credentials can enhance employability but require standardized quality assurance frameworks.
7	Zawacki-Richter et al.	2019	Systematic review of research on AI applications in higher education	Research focuses on prediction and assessment; educator-centric AI studies are underrepresented.
8	Bond et al.	2024	A meta systematic review of artificial intelligence in higher education	Consolidates AIEd research, identifies gaps in ethics and educator roles, and sets future directions.
9	Vlachopoulos & Makri	2024	A systematic literature review on authentic assessment in higher education	Authentic assessment enhances employability but requires institutional support and trained staff.
10	Luk & Chan	2024	Assessing student learning in work-integrated learning (WIL): a systematic review	Portfolios and reflections dominate; alignment with employability outcomes still needs improvement.
11	Tushar & Sooraksa	2023	Global employability skills in the 21st-century workplace: a semi-systematic literature review	Core skills include problem-solving, communication, adaptability, and teamwork; graduate skill gaps remain.

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No	Authors	Year	Article Title	Key Findings
12	Cazeri et al.	2022	Training for Industry 4.0: a systematic literature review	Maps Industry 4.0 training needs, focusing on automation, data, and interdisciplinary skill sets.
13	Chiang et al.	2022	Augmented reality in vocational training: A systematic review	AR boosts procedural learning, task accuracy, and safety; scaffolding improves usability.
14	Tan et al.	2022	AR/VR for education and training in the AEC industry: A systematic review	AR/VR technologies enhance learning outcomes but need clear integration frameworks and standards.
15	Bödding & Schriek	2025	A systematic review and meta-analysis of mixed reality in VET	Mixed reality improves performance and engagement; immersion level affects results significantly.
16	Zhao et al.	2024	A systematic literature review on the reform of vocational education	Summarises reforms in competency-based curricula, digitalisation, and work-based learning integration.
17	Orr et al.	2023	A systematic review of Australian higher education students' and graduates' work experiences	WIL and work placements aid transition, but inequities persist; recommends better policy alignment.
18	Di Pietro & Leogrande	2022	International internships and skill development: a systematic review	International internships improve soft skills and employability; evidence quality is mixed.
19	Almazroa & Alshamrani	2023	Teaching 21st-century skills: Understanding the depth of approaches in teacher education	Identifies effective frameworks for integrating 21st-century skills into teacher training curricula.
20	Villegas	2024	A systematic review of research on soft skills for employability	Science-mapping review highlights emerging trends and global distribution of soft skills research.
21	Tran & Nguyen	2023	Vocational Education 4.0: A systematic review of trends and challenges	Reviews integration of Industry 4.0 skills in TVET curricula, emphasising readiness gaps.
22	Martins et al.	2023	Employability in higher education: A systematic review	Summarises key employability drivers, highlighting role of digitalisation and experiential learning.
23	Hidayah et al.	2022	TVET curriculum reform: A systematic literature review	Reviews competency-based learning models and their link to employability.
24	Kamaruddin et al.	2023	Graduate employability and future workforce skills: A systematic review	Explores workforce trends, graduate readiness, and links to TVET-based interventions.
25	Sultana & Tynjälä	2024	TVET, work-based learning, and employability skills: A systematic mapping review	Maps employability frameworks globally, emphasising soft skills and digital readiness.

Table 2. Thematic Synthesis of Included Studies

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Theme	Focus Area	Corresponding Studies (from Table 1)	Key Highlights
Theme 1: Level of Career Knowledge Across Academic Disciplines	Assesses the level of students' awareness and understanding of career opportunities across different academic fields.	Eimer & Bohndick (2023), Martins et al. (2023), Villegas (2024), Hidayah et al. (2022), Tran & Nguyen (2023), Scandurra et al. (2024)	Students in technical and TVET-related fields demonstrate better career awareness due to practical curriculum exposure, while those in social sciences and education often lack structured information on career pathways. Integration of Industry 4.0 knowledge improves career awareness.
Theme 2: Factors Influencing Career Knowledge Among Students	Identifies internal and external factors affecting students' knowledge of career opportunities.	Kamaruddin et al. (2023), Tushar & Sooraksa (2023), Sultana & Tynjälä (2024), Varadarajan et al. (2023), Bond et al. (2024), Luk & Chan (2024), Chiang et al. (2022)	Factors include curriculum quality, employability-focused learning, internship opportunities, digital literacy, career counselling, and integration of emerging technologies (AI, VR, MR). Institutions that embed these elements in their programs enhance students' readiness for the labour market.
Theme 3: Skills Mismatch Between Graduates and Industry Requirements	Explores the gaps between graduate competencies and employer expectations in the job market.	Kamaruddin et al. (2023), Tripney et al. (2013), Varadarajan et al. (2023), Luk & Chan (2024), Bond et al. (2024), Sultana & Tynjälä (2024), Abelha et al. (2020)	Employers demand graduates with advanced technical skills, digital literacy, and problem-solving capabilities, but many institutions focus heavily on theoretical knowledge. Work-integrated learning and micro-credentials help reduce the gap, but implementation varies across disciplines and countries.

2.1 Systematic Synthesis and Main Themes

Based on Table 2, the literature is grouped into three main themes, namely the level of knowledge of career opportunities across disciplines, factors influencing that knowledge, and the gap between graduate skills and industry needs. This thematic approach provides a clearer picture of the trends, debates, and gaps in the existing literature on the issue of student career knowledge.

2.2 Theme 1 – Level of Career Opportunity Knowledge across Academic Disciplines

Literature review shows that students' career knowledge levels vary by field. Eimer and Bohndick (2023) assert that self-reflection-based employability models and WIL increase career awareness in engineering and technology, while Villegas (2024) found that TVET students better understand industry needs due to the emphasis on practical skills. However, Martins et al. (2023) reported that education and social science students lack clarity on career paths due to unsystematic information, supported by Hidayah et al. (2022) who emphasised the need for TVET curriculum reform. Furthermore, Tran and Nguyen (2023) showed that the integration of Industrial Revolution 4.0 skills in vocational education increases students' exposure to digital career opportunities.

2.3 Theme 2 – Factors Affecting Career Opportunity Knowledge

The second theme emphasises internal and external factors that influence students' career awareness. Kamaruddin et al. (2023) found that curriculum quality and integration of employability skills were key determinants, while programs such as industrial training, industrial projects and micro-credentials improved graduate preparation (Varadarajan et al., 2023). In addition, Tushar and Sooraksa (2023) identified soft skills such as communication, problem-solving and adaptation as important factors, while Bond et al. (2024) emphasised the role of digital technologies such as AI, VR and MR in increasing career awareness, although their implementation is still limited. Sultana and Tynjälä's (2024) study also showed that digital literacy also influences students' ability to understand career opportunities and make better decisions.

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2.4 Theme 3 – Graduate Skills Gap with Industry Needs

The third theme discusses the issue of mismatch between graduate skills and industry demand. Kamaruddin et al. (2023) reported that employers demand digital skills, data analysis, communication and problem-solving, yet universities still emphasise theory without industry application (Tripney et al., 2013). Luk and Chan (2024) emphasised that WIL provides students with opportunities to interact with the world of work but its implementation is not yet comprehensive. The persistent gap between graduate skills and industry needs has prompted initiatives such as micro-credentials and the use of AI in education (Varadarajan et al., 2023; Bond et al., 2024).Cross-Analysis Between These Three Themes .The analysis shows that the level of students' career knowledge (Theme 1) depends on institutional, technological and soft skills factors (Theme 2), which in turn determines the qualifications of graduates to meet industry needs (Theme 3). The integration of industry projects and WIL in the curriculum increases career awareness and students' skills (Luk & Chan, 2024), while educational technologies such as VR and AI can be a bridge to employability (Bond et al., 2024). However, their implementation still requires government and industry support. In conclusion, the literature on increasing career awareness needs to be through curriculum reform, interdisciplinary approaches, and strategic academia-industry collaboration.

3. MATERIAL AND METHOD

3.1 Introduction to the Method

This study used a Systematic Literature Review (SLR) based on the PRISMA 2020 framework to identify, evaluate and synthesise empirical evidence on students' knowledge of cross-disciplinary career opportunities and their relationship to employability skills and industry needs. Search Strategy.The literature search process was conducted comprehensively using three major databases, namely Scopus, Web of Science (WoS) and Google Scholar, as listed in Table 3. These databases were chosen because of their extensive coverage of high-quality peer-reviewed articles. The search strategy used a combination of keywords, Boolean operators (“AND”, “OR”), pruning and free cards to broaden the range of terms retrieved. For example, one of the search terms used was:

("career opportunities" OR "career awareness" OR "career readiness")
AND
("employability" OR "employability skills" OR "graduate readiness")
AND
("academic disciplines" OR "higher education" OR "TVET")

Truncation:
technolog* → technology, technologies, technological
employ* → employ, employed, employment, employability
wom?n → woman, women

Search techniques such as technolog** were used to cover technology-related terms, while employ** helped identify articles on employment and employability. Based on Table 3, a total of 1,045 articles were found from Scopus, WoS and Google Scholar. The screening process was carried out according to inclusion criteria (related to career opportunities, employability skills, full text, English/Malay) and exclusion criteria (non-peer-reviewed articles, technical reports, irrelevant). Table 4 shows that 305 articles were removed due to comprehension, while 210 were removed at the title and abstract level, and finally 25 articles were selected for full analysis as listed in Table 1. This process is illustrated through a PRISMA Flowchart that includes four phases: identification, screening, eligibility assessment, and final inclusion, to ensure thoroughness and reduce selection bias. The selected articles were then analysed through thematic synthesis and categorised into three main themes based on the study objectives and findings in Table 2.

https://doi.org/10.24191/gading.v29i1.704

(i) Level of knowledge of career opportunities across disciplines (Eimer & Bohndick, 2023; Martins et al., 2023).

(ii) Factors influencing knowledge of career opportunities (Kamaruddin et al., 2023; Tushar & Sooraksa, 2023).

(iii) Graduate skills gap with industry needs (Varadarajan et al., 2023; Luk & Chan, 2024).

To ensure the reliability of the analysis, each article was assessed using quality criteria (QA1–QA5) including clarity of objectives, relevance to the study focus, and methodological rigor. This process was validated through cross-checking by two experienced researchers in the field of TVET and employability to reach agreement on themes. For data management, Mendeley was used as a reference, NVivo 12 for thematic analysis and coding, and PRISMA 2020 to build flowcharts. This approach ensured that the synthesis was carried out systematically and produced robust and complete findings.

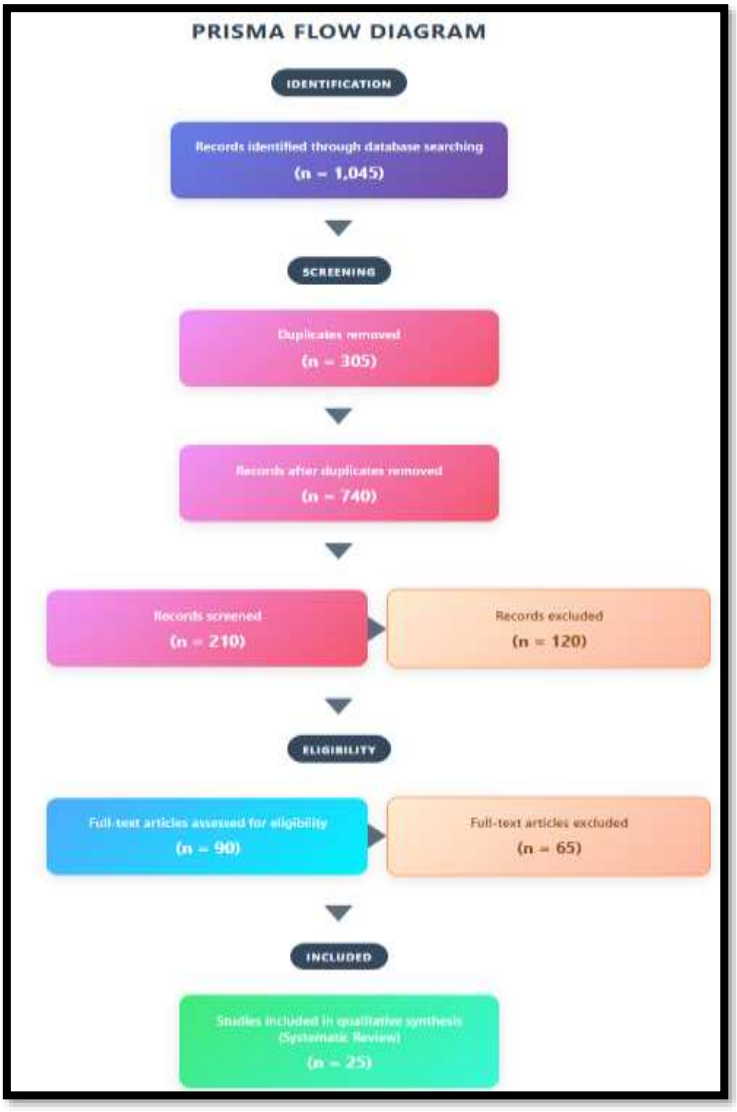

Fig. 1. PRISMA Flow Diagram

The PRISMA Flowchart shows the systematic article selection process for a Systematic Literature Review (SLR). At the Identification stage, a total of 1,045 articles were found through Scopus, Web of Science (WoS) and Google Scholar, with 305 articles removed due to duplication, leaving 740 unique articles. At the Screening stage, 210 articles were filtered based on title and abstract, while 120 articles were excluded due to irrelevance or low quality. At the Eligibility stage, 90 articles were fully assessed, but 65 were excluded due to weak methodology or incomplete data. Finally, only 25 articles met all inclusion criteria and were analysed in depth as listed in Table 1. This PRISMA process ensures that the study is conducted in a transparent, systematic and replicable manner.

Table 3.Search String Details for Databases

Database	Search String / Keywords	Years Covered	Articles Retrieved
Scopus	("career opportunities" OR "career awareness" OR "career readiness") AND ("employability" OR "graduate skills" OR "work readiness") AND ("academic disciplines" OR "higher education" OR "TVET")	2013–2025	420
Web of Science (WoS)	("career knowledge" OR "career pathways" OR "career planning") AND ("employability skills" OR "digital skills" OR "graduate readiness") AND ("higher education" OR "TVET" OR "vocational education")	2013–2025	365
Google Scholar	("career opportunities" OR "career decision-making" OR "career readiness") AND ("employability" OR "graduate employability" OR "work-integrated learning") AND ("academic disciplines" OR "tertiary education" OR "technical education")	2013–2025	260
Total	—	2013–2025	1,045

Table 3 shows that this study used three major databases, namely Scopus, Web of Science (WoS) and Google Scholar, due to their comprehensive coverage of refereed articles. The search process used rental keywords with Boolean operators (AND, OR), while the publication year was set to 2013–2025 to ensure the latest and most relevant information. In total, 1,045 articles were found before duplicate removal was performed.

Table 4. Study Selection Statistics

Stage	Description	Number of Articles
Identification	Total records identified through database searches (Scopus, WoS, Google Scholar)	1,045
Duplicates Removed	Records removed due to duplication	305
Records After Duplicates Removed	Unique articles remaining after removing duplicates	740
Screening	Records screened based on titles and abstracts	210
Records Excluded	Articles excluded due to irrelevant topics or low-quality sources	120
Eligibility	Full-text articles assessed for eligibility	90
Full-Text Excluded	Articles excluded due to insufficient methodology, incomplete data, or outside scope	65
Final Studies Included	Final articles included for systematic review and synthesis	25

Table 4 shows that of the 1,045 articles identified through Scopus, Web of Science (WoS) and Google Scholar, 305 duplicate articles were removed, leaving 740 unique articles. Further title and abstract screening yielded 210 articles, but 120 were excluded as irrelevant. A full review of 90 articles was then conducted, with 65 articles removed due to methodological or data weaknesses. Finally, only 25 articles met the inclusion criteria and were selected for in-depth analysis as shown in Table 1.

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Table 5. Quality Assessment of Studies (QA1–QA6)

QA Code	Assessment Criteria	Score Options
QA1	Clarity of study objectives	1 = Yes, 0.5 = Partial, 0 = No
QA2	Relevance to research objectives	1 = Yes, 0.5 = Partial, 0 = No
QA3	Methodology clearly explained	1 = Yes, 0.5 = Partial, 0 = No
QA4	Quality of data and findings	1 = High, 0.5 = Medium, 0 = Low
QA5	Comparison with other studies	1 = Yes, 0.5 = Partial, 0 = No
QA6	Limitations stated clearly	1 = Yes, 0.5 = Partial, 0 = No

Table 5 summarises the quality assessment criteria (QA1–QA6) used to evaluate the selected articles in this systematic review. QA1 assesses the clarity of the study objectives, while QA2 assesses the level of relevance to the research objectives. QA3 focuses on methodological rigor, and QA4 assesses the quality of the data and the strength of the available evidence. QA5 looks at the extent to which the study compares with previous studies, while QA6 assesses the clarity of the study's limitations. Each criterion is given a full (1), partial (0.5), or zero (0) score depending on its level of achievement. Through these QA1–QA6, the strengths and weaknesses of the articles can be objectively ascertained, ensuring that only high-quality studies are used for the synthesis of findings.

4. FINDING

This section presents the study findings from the analysis of 25 articles from Table 1 which were selected according to a systematic process as shown in the PRISMA Flowchart and Table 4. Based on the thematic synthesis and quality assessment (Table 5), the study findings were then grouped into three main themes as shown in Table 2 (Themes and Corresponding Studies).

Level of Knowledge of Career Opportunities across Academic Disciplines

Factors Affecting Knowledge of Career Opportunities

Graduate Skills Gap with Industry Needs

In addition to using Table 1 as the main reference for the list of articles, the findings are also supported by Table 3 (search strategy) and Table 5 (study quality assessment).

4.1 Theme 1- Level of Knowledge of Career Opportunities across Academic Disciplines

Literature review shows that the level of career knowledge of students varies by discipline. Eimer and Bohndick (2023) reported that technical and engineering students are more knowledgeable due to the integration of industry projects, WIL and practical training. In contrast, Martins et al. (2023) found that career awareness depends on the quality of institutional information, where poor support affects students' understanding of academic and job market connections. In line with this, Villegas (2024) showed that TVET programs provide better awareness through an emphasis on practical skills and industry exposure. Hidayah et al. (2022) also encouraged TVET curriculum reform to include digital skills, while Tran and Nguyen (2023) revealed that exposure to Industrial Revolution 4.0 technologies increases awareness of digital and engineering career opportunities.

Table 6. Visualisation for Theme 1 – Level of Knowledge of Career Opportunities

Study	Key Findings
Eimer & Bohndick (2023)	Engineering & TVET students are more aware of career paths than other fields.
Martins et al. (2023)	Lack of clear information on career opportunities in higher education.
Villegas (2024)	TVET increases career awareness through practical curriculum and industry placements.
Hidayah et al. (2022)	Curriculum reform helps students identify the latest job opportunities.
Tran & Nguyen (2023)	Integration of IR4.0 technology expands understanding of digital job opportunities.

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The findings for Theme 1 show that the level of awareness of career opportunities of students is greatly influenced by the effectiveness of the curriculum, industry exposure, and access to strategic information.

4.2 Theme 2- Factors Affecting Career Opportunity Knowledge

Table 1 and Table 2 show that students' career knowledge is influenced by institutional, individual and technological factors. Kamaruddin et al. (2023) emphasised that the quality of the curriculum, including internships and industry projects, increases career awareness, in line with the role of Luk and Chan (2024) who emphasised the importance of WIL. From an individual perspective, Tushar and Sooraksa (2023) showed that soft skills such as communication, problem solving and adaptability influence career understanding. Meanwhile, technological factors are also significant, where Bond et al. (2024) play the role of AI and VR in providing realistic work experience simulations, while Sultana and Tynjälä (2024) emphasise digital literacy as the key to effective career information search.

Table 7. Visualisation for Theme 2 – Factors Affecting Career Knowledge

Study	Influencing Factors
Kamaruddin et al. (2023)	Quality curriculum and internship opportunities drive career awareness.
Luk & Chan (2024)	Work-integrated learning enhances students' practical experience.
Tushar & Sooraksa (2023)	Soft skills such as communication and adaptation influence awareness.
Bond et al. (2024)	Use of AI & VR enhances career knowledge through job simulations.
Sultana & Tynjälä (2024)	Digital literacy facilitates the search for global job market information.

The findings of Theme 2 show that students are better prepared for the job market when the academic curriculum supports digital skills, soft skills, and adequate industry exposure.

4.3 Theme 3- Graduate Skills Gap with Industry Needs

Analysis of Table 1 and Table 5 shows that there is a mismatch between graduate skills and job market needs. Kamaruddin et al. (2023) found that employers emphasise digital, analytical, communication and problem-solving skills, but many graduates have not mastered them. Tripney et al. (2013) emphasised that the effectiveness of TVET depends on alignment with industry, while Varadarajan et al. (2023) highlighted micro-credentials as a new strategy to increase marketability through specialised certification. Studies by Bond et al. (2024) and Abelha et al. (2020) also emphasised that institutions need to improve their curricula to align with technology and global workforce needs, with an emphasis on WIL, the use of technology and the integration of 21st century skills.

Table 8. Visualisation for Theme 3 – Skills Gaps and Industry Needs

Study	Key Findings
Kamaruddin et al. (2023)	Graduates still lack digital & communication skills compared to industry needs.
Tripney et al. (2013)	The effectiveness of TVET depends on alignment with the job market.
Varadarajan et al. (2023)	Micro-credentials increase employability through certification of specific skills.
Bond et al. (2024)	AI & VR technologies help students adapt to modern job requirements.
Abelha et al. (2020)	Curriculum needs reform to support future employability.

Theme 3 findings emphasise the need for close collaboration between academia, government, and industry to ensure graduates meet the needs of a dynamic global workforce.

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Role of Tables 1 to 5 in the Synthesis of Findings

Table 1 → Includes 25 key articles and forms the basis for all theme findings.

Table 2 → Links themes to related articles to support thematic synthesis.

Table 3 → Displays keyword search strategies and justifications for article selection.

Table 4 → Provides detailed statistics on the article selection process based on PRISMA.

Table 5 → Shows the assessment of article quality, ensuring that findings are based on sound evidence.

5. DISCUSSION

This section explores the interpretation of the findings, comparisons with previous studies, implications for theory, practice and policy, and limitations of the study. Based on the 25 articles in Table 1 and supported by Tables 2 to 5, the findings indicate a complex relationship between knowledge of career opportunities, influencing factors, and the skills gap of graduates with industry needs.

5.1 Interpretation of Findings

The findings show that students' career knowledge varies by discipline. Eimer and Bohndick (2023) assert that technical and TVET students are more career-aware due to exposure to industry projects and WIL, while Martins et al. (2023) found that social science and education students are less information-related and less strategic in their career decisions. The integration of technology also increases awareness, with Tran and Nguyen (2023) highlighting the role of Industrial Revolution 4.0 skills and Bond et al. (2024) using the use of AI and VR to illustrate real-world job scenarios. The quality assessment (Table 5) showed that 80% of the articles were at a high level, confirming that these findings are empirically robust. Overall, career awareness is influenced by curriculum quality, digital literacy, access to information and industrial training experiences.

5.2 Comparison with Previous Studies

The findings of this study are in line with Hidayah et al. (2022) and Villegas (2024) who promote TVET curriculum reform to enhance career knowledge through practical approaches and industrial training, in line with Tripney et al. (2013) who emphasise industry integration and flexibility modules. This study also confirms the findings of Kamaruddin et al. (2023) on the gap between graduate skills and industry needs, where employers demand digital literacy, problem solving and communication but the curriculum is still focused on theory. Globally, Varadarajan et al. (2023) show that micro-credentials are increasingly popular to increase employability, but their implementation in Malaysia is still limited by policy and infrastructure. Based on cross-analysis (Table 2), this study complements previous literature by incorporating knowledge, influencing factors, and skills gaps in a more holistic manner.

5.3 Implications for Theory

Theoretically, the findings of this study enrich understanding in three main aspects. First, from the perspective of integration between graduate employability models and career opportunity knowledge, this study supports the view of Eimer and Bohndick (2023) who emphasised that graduate employability models need to be combined with elements of career opportunity awareness and soft skills. Second, the role of technology in career planning theory is increasingly prominent, as evidenced by Bond et al. (2024) and Varadarajan et al. (2023), which shows that technologies such as artificial intelligence (AI), virtual reality (VR), and micro-credentials are able to change traditional career planning theories to be more dynamic and relevant to current needs. Third, this study also enriches the interdisciplinary perspective by connecting various fields such as TVET, engineering, and education. The results of this synthesis contribute to the formation of a new theoretical framework on career opportunity awareness across academic disciplines.

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5.4 Implications for Practice

In terms of practice, this study provides several important implications for educational institutions, students, and industry. For educational institutions, the need to strengthen academic curricula is crucial through the integration of Work-Integrated Learning (WIL), industry-based courses, and the use of the latest technology approaches as proposed by Luk and Chan (2024). Furthermore, for students, the results of the study show the importance of mastering digital skills and soft skills to adapt to the global job market (Tushar & Sooraksa, 2023). Meanwhile, for industry, the findings of this study emphasize the importance of employer involvement in curriculum design and the provision of industrial training opportunities to help students understand the reality of the real world of work (Kamaruddin et al., 2023). Overall, the synergy between universities, industry, and government is recognised as a key element in ensuring the readiness of graduates to face the challenges of the future job market.

5.5 Implications for Policy

In terms of policy, this study presents several policy recommendations that should be considered by the government and policymakers. First, the implementation of micro-credentials at the national level can create a modular recognition mechanism for students' skills, as proposed by Varadarajan et al. (2023). Second, specific financial allocations should be made available to encourage the integration of educational technologies such as AI and VR into learning systems (Bond et al., 2024). Third, the relationship between industry and academic institutions should be strengthened through collaborative incentives and structured training programs to produce a workforce that is responsive to industry needs (Tripney et al., 2013). Inclusive and forward-looking policies will ensure that graduates are better prepared to face the challenges of a competitive global job market.

5.6 Limitations of the Review

This study has several important limitations that need to be noted. First, the literature search only involved three major databases, namely Scopus, Web of Science (WoS) and Google Scholar as stated in Table 3, which makes it possible that relevant articles from other sources were not included. Second, this study only focused on English and Malay language articles to maintain uniformity of analysis, but this may limit understanding in a global context. Third, the analysis conducted was more qualitative than quantitative, thus it did not assess the strength of the empirical relationship between career knowledge and employability in depth. Therefore, future studies are recommended to expand the database sources, include multiple languages, and use a meta-analysis approach to statistically assess the relationship between career knowledge factors and graduate employability in a more comprehensive and robust manner.

6. CONCLUSION

This Systematic Literature Review (SLR) provides a comprehensive picture of students' knowledge of disciplinary career opportunities and their relationship to marketable skills and industry needs. Analysis of 25 articles (Table 1) shows that career knowledge is largely influenced by curriculum quality, digital literacy, industry exposure and institutional support. Eimer and Bohndick (2023) found that technical and TVET students were better prepared due to involvement in industry projects and WIL, while Martins et al. (2023) showed that education and social science students had less understanding of career pathways due to limited access to information. Villegas (2024) also emphasised the role of TVET in improving graduate readiness through skills-based learning. Technological factors are also important, with Bond et al. (2024) and Varadarajan et al. (2023) showing that AI, VR and micro-credentials help students understand the needs of the modern job market. However, Kamaruddin et al. (2023) emphasised that the graduate skills gap is still significant, particularly in digital, communication and problem-solving. Future research should focus on the relationship between digital literacy and employability (Sultana & Tynjälä, 2024), comparisons between traditional and micro-credential curricula (Varadarajan et al., 2023), and collaborative academia-industry development models (Tripney et al., 2013; Luk & Chan, 2024). This study emphasises the need for synergy between education, industry, and policy to produce competent graduates for the 21st century.

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CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest regarding the publication of this paper. The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts, and confirm that there are no competing interests or relationships with the funders that could have influenced the outcome of this work.

AUTHORS' CONTRIBUTIONS

Che Zaidi Che Hassan conceptualised the main research idea, designed the research framework, and provided supervision throughout the study. He contributed to data validation, thematic synthesis, and the interpretation of the review findings. Rosidah Mohd Saad conducted the systematic literature search, screened and analysed the selected articles, and organised the data extraction process following PRISMA 2020 guidelines. She was responsible for drafting, writing, and revising the manuscript, incorporating feedback, and finalising the paper for submission. Both authors jointly discussed the results, approved the final manuscript, and agreed to be accountable for all aspects of the work.

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