

Digital Skills as Success Factors in TVET Entrepreneurship Education: A Systematic Review

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Abstract

This study aims to investigate the significance of digital skills as determinants of success in Technical and Vocational Education and Training (TVET) entrepreneurship education by conducting a systematic literature review. The progression of the study complies with the PRISMA framework to ensure a thorough and transparent approach. Research, experiments, and implementation strategies related to digital skills and entrepreneurship in TVET were all included in the extensive and detailed examination of current research. An advanced search technique was employed using keywords such as "digital skill," "success," "entrepreneurship," "education," and "TVET" across reputable databases, including Scopus, Web of Science (WoS), and ERIC. The inclusion criteria focused on peer-reviewed articles published between 2020 and 2024, yielding a final selection of 19 studies as the primary data source. A mixed-method approach was applied to analyse the findings systematically. The results of the review were categorized into three main themes: (1) digital competence, (2) digital education and training, and (3) entrepreneurial development. Digital competence emerged as the dominant theme, emphasizing the importance of technical proficiency, critical problem-solving, and the effective use of digital tools in enhancing entrepreneurial success. Digital education and training fostered digital literacy through hands-on learning approaches, real-world case studies, and competency-based learning methods. On the other hand, entrepreneurial development highlighted the need for building self-efficacy, leadership, creativity, and digital readiness among TVET students. The study concludes that integrating digital skills into TVET entrepreneurship education is critical for preparing graduates to thrive in the digital economy. Addressing challenges such as infrastructure gaps, limited access to technology, and the need for industry-aligned curricula can enable TVET institutions to cultivate innovative, adaptable, and forward-thinking entrepreneurs. This integration ultimately has the potential to drive sustainable economic growth and enhance graduate employability in the digital era.

Keywords: Digital skills, success, entrepreneurship, education, TVET.

Introduction

The rapid expansion of digital technology has significantly impacted the global economy, creating both opportunities and challenges for educational institutions globally (Ahmedov, 2020). Technical and Vocational Education and Training (TVET) is now recognized as an essential pathway for equipping individuals with the vital skills for growth in the digital economy (Mustaffa et al., 2024). In order to encourage their students, institutions embrace a mindset of entrepreneurship and incorporate entrepreneurial courses within the education program (Fernández-Pérez et al., 2019). The dynamic nature of the digital era involves the integration of digital skills and the presence of successful entrepreneurs who utilize digital technology, such as operating an internet business. The dynamic character of the digital era necessitates the integration of digital skills (Rachmawati & Nurhajati, 2019). Digital skills, including communication, content production, and problem-solving, empower students to use technology for business management and expansion (Barboutidis & Stiakakis, 2023).

Digital skills comprise a wide array of competencies, including information literacy, communication, digital content production, problem-solving, and the utilization of digital tools to facilitate corporate operations (Zeidmane & Vintere, 2021). These abilities are crucial for adapting to the changing entrepreneurial landscape, especially in the internet business sector. The integration of entrepreneurship education with digital literacy empowers students to utilize technology for idea generation, company

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management, marketing, and expansion of their ventures (Zhang et al., 2021). Despite the increasing focus on digital skills, there is an absence of systematic comprehension of how these competencies directly influence the success of entrepreneurial ventures among TVET graduates (McCallum, 2019).

As the global economy becomes more digitalized, the demand for digital skills has increased significantly in a variety of sectors (Obermayer et al., 2022). Business operations and competition are being transformed by digital technologies (Lubis, 2019). This transition highlights the essential requirement for educational institutions and training programs to prepare individuals with the requisite skills to succeed in this changing environment. By integrating digital entrepreneurship into technical and vocational education, institutions can empower graduates with not only technical knowledge but also the innovative mindset required to utilize technology for business success (World Bank Group, 2018). This alignment of education with market demands is essential in encouraging sustainability in the economy and fostering a culture of continuous innovation (Bican & Brem, 2020).

TVET and digital entrepreneurship must intersect to meet the needs of a labour market that is rapidly transforms (Di Battista et al., 2023). According to Lindner (2020), TVET institutions must adapt by integrating digital skills into their curricula as industry embrace digital technology more and more. This ensures that graduates possess the entrepreneurial mindset and technical capabilities required to thrive in the digital economy (UNESCO, 2023). By bridging the gap between traditional vocational training and modern entrepreneurial needs, TVET can serve as a catalyst for economic sustainability and adaptability (Ahmedov, 2020).

Recent statistics highlight the urgency of this integration. The World Economic Forum (2023) had stated that by 2030, over 60% of new job opportunities will necessitate digital proficiency. Consequently, educational institutions must ensure that their programs are in accordance with these requirements (Di Battista et al., 2023). A report released by the World Economic Forum in 2022 reveals that digital entrepreneurship accounts for 15% of GDP growth in emerging nations, emphasizing its crucial role in fostering economic growth (Ekudden, 2022). These numbers highlight the need of exploring how digital skills might propel entrepreneurial success in the context of TVET.

Background of the Studies

The integration of digital skills into Technical and Vocational Education and Training (TVET) is increasingly recognized as an essential element for encouraging entrepreneurship among students (Mustaffa et al., 2024). The need for knowledgeable entrepreneurs with the ability to operate in digital environments has increased as the world economy continues to change. (World Bank Group, 2018). This transition requires a reassessment of TVET courses to integrate digital skills that correspond with modern entrepreneurial approaches (D'Angelo et al., 2023). Research indicates that while entrepreneurship education is essential for enhancing employability and fostering innovation, many TVET programs have yet to fully integrate digital skills into their frameworks, limiting the potential for student success in entrepreneurial ventures (Zascerinska, 2022).

This study aims to fill this gap by conducting a systematic literature review (SLR) to identify and examine the importance of digital skills as determinants of success in TVET entrepreneurship courses. The review will examine current academic literature to identify the digital competences that strengthen the entrepreneurship skills of TVET students and graduates. This systematic literature review will explore the correlation between digital competencies, digital education and training and entrepreneurial development, emphasizing critical aspects that influence online business success in TVET environments (Udekwe & Iwu, 2024).

By integrating findings from various studies, this article seeks to provide educators, policymakers, and stakeholders with a deeper understanding of the importance of digital skills integration in TVET entrepreneurship education. The outcomes of this review are expected to inform curriculum development, teaching strategies, and policy frameworks that align with the demands of the digital economy. Ultimately,

the study aims to contribute to the ongoing discourse on enhancing TVET's role in producing resilient, innovative, and successful digital entrepreneurs.

Literature Review

Digital skills are increasingly recognized as essential to success in Technical and Vocational Education and Training (TVET) entrepreneurship education (Mustaffa et al., 2024). This literature review synthesizes findings from various studies that highlight the interplay between digital skills and entrepreneurial success within the context of TVET.

The Role of Digital Skills in Entrepreneurial Intentions

A study involving final-year undergraduate students in Jordan investigated the influence of digital skills on their entrepreneurial goals, especially following the COVID-19 epidemic. The study indicated a significant negative relationship between digital capabilities and entrepreneurial intents, suggesting that although digital competencies are essential, they do not inherently encourage entrepreneurial ambition. The research highlighted the moderating impact of entrepreneurship education, which could strengthen students' entrepreneurial awareness and goals. This indicates that educational frameworks should incorporate digital competencies with entrepreneurship training to create a supportive environment for emerging entrepreneurs (Abaddi, 2024).

Enhancing Competencies through Digital Entrepreneurship Education

Another research effort focused on the effectiveness of digital entrepreneurship education in enhancing soft skills among undergraduates in Malaysia. The results demonstrated that the incorporation of digital entrepreneurship courses into current curricula markedly enhanced students' soft skills, essential for successful entrepreneurship. Nevertheless, the study observed that leadership abilities were less strengthened in comparison to other skills. This underscores the imperative for TVET programs to incorporate digital skills training while also fostering a comprehensive development of the essential soft skills necessary in the entrepreneurial environment (Zainal & Kelvin Yong, 2020).

Digital Literacy and Entrepreneurial Competencies

A recent study examined the mediating function of digital literacy in the development of entrepreneurial competences, focusing on the impact of government assistance and educational quality on skill acquisition. The study emphasized that successful entrepreneurship education should integrate digital literacy as a fundamental component to improve students' cognitive and practical skills. By emphasizing both digital and entrepreneurial competencies, TVET colleges may more effectively equip students for the requirements of contemporary enterprise, and comply with global educational standards (Hermawan et al., 2025).

Bridging Gender Gaps through Digital Skills Training

Research on female entrepreneurship in Serbia emphasized the essential importance of education and entrepreneurial learning in closing the gender gap in the digital economy. The research demonstrated that providing women with essential digital competencies markedly enhanced their capacity to initiate and expand enterprises. This underscores the need of specialized TVET programs that tackle gender inequities by cultivating an inclusive environment in which women may excel as entrepreneurs in the digital era (Mitic et al., 2020).

Challenges and Opportunities in Digital Transformation

The use of digital technologies in entrepreneurship education has demonstrated the ability to increase teaching techniques and expand student performance. A case study indicated that despite ongoing problems including poor digital literacy and unreliable internet connectivity, significant prospects for growth exist via enhanced confidence in utilizing digital technologies. This indicates that TVET programs should not alone

concentrate on delivering technical knowledge but also tackle infrastructure obstacles to fully harness the potential of digital entrepreneurship education (Nurhayati et al., 2024).

In conclusion, the research that has been conducted suggests that there is a significant connection between digital skills and effective outcomes in the field of TVET entrepreneurship education. To adequately educate students for the changing needs of the market, educational institutions must take a comprehensive strategy that combines conventional entrepreneurship training with digital capabilities.

Material and Methods

Identification

Several important phases in the systematic review method were employed to choose a large amount of relevant literature for this study's research. Initially, keywords were identified by conducting pilot searches to ensure their relevance and comprehensiveness. This process included exploring associated terms utilizing dictionaries, thesauruses, encyclopaedias, and previous research. To strengthen the search process, a thesaurus was used to identify synonyms, and a pilot search was conducted on each database to refine the search strings iteratively.

All appropriate keywords were finalized after the formulation of search strings for the Eric, Web of Science, and Scopus databases (see Table 1). Additionally, automation tools embedded within the databases were employed to streamline the search and ensure consistency across platforms. Boolean operators such as AND, OR, and NOT were utilized to narrow or broaden the search as needed. To further ensure the quality of the search process, the inclusion of peer-reviewed journal articles and specific publication years (2020–2024) was set as a primary filter.

In the initial phase of the systematic review procedure, 1,698 publications from all databases were effectively gathered for the present study project. These publications were then categorized by subject area, journal quality, and methodological relevance to facilitate subsequent screening and analysis.

Table 1: The Search String

Scopus	ALL (("digital skill*" OR "ICT skill*") AND success* AND (entrepreneur* OR business) AND education AND (vocational OR tvet)) AND PUBYEAR > 2019 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA ,"SOCI") OR LIMIT-TO (SUBJAREA ,"BUSI")) AND (LIMIT-TO (PUBSTAGE ,"final")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (OA,"all")) AND (LIMIT-TO (SRCTYPE, "j"))
WoS	(ALL=((digital OR technology OR ICT) AND skill* AND (success* OR key*) AND (factor* OR indicator* OR element*) AND (entrepreneur* OR enterprise OR business) AND (education OR learning OR teaching) AND (technical OR vocational OR tvet))) AND (PY==("2020" OR "2021" OR "2022" OR "2023" OR "2024") AND DT==("ARTICLE") AND LA==("ENGLISH") AND OAJ==("ALL OPEN ACCESS") AND SJ==("EDUCATION EDUCATIONAL RESEARCH" OR "BUSINESS ECONOMICS" OR "SOCIAL SCIENCES OTHER TOPICS" OR "SOCIAL ISSUES"))
Eric	Digital AND Skills AND Success AND (technical OR vocational OR tvet) AND Entrepreneur* AND Education

Screening

The screening procedure is evaluating the collected potentially relevant study materials against the defined research subject or questions. At this level, research themes emphasizing digital skills as critical success factors in TVET entrepreneurship education are frequently selected. This is the location where duplicate documents are removed. The initial screening step eliminated 1,618 papers for reasons of irrelevance,

redundancy, or non-compliance with the overarching research requirements. Subsequently, 80 publications were assessed according to defined inclusion and exclusion criteria relevant to this investigation (refer to Table 2). The inclusion criteria emphasized peer-reviewed journal papers, studies published between 2020 and 2024, and research specifically concerning digital skills in relation to TVET or entrepreneurship. The exclusion criteria involved the elimination of grey literature, papers without full-text availability, and publications not in English. To ensure a thorough evaluation, all publications were assessed by two independent reviewers, with any disagreements resolved through consensus discussions.

The literature, comprising research articles, served as the primary criteria due to its significance in providing practical advice. The review encompassed several literary genres, including reviews, meta-syntheses, meta-analyses, novels, book series, chapters, and conference proceedings excluded from the most recent study. The screening approach guaranteed that the chosen papers had a solid methodological basis consistent with the aims of this systematic review. Nineteen (19) studies that fulfilled all criteria were identified during the screening process. The studies were also classified according to their study design, geographical location, and area of concentration. This methodical methodology guaranteed that the final selection was thorough, relevant, and of superior quality, serving as the foundation for further abstraction and analysis.

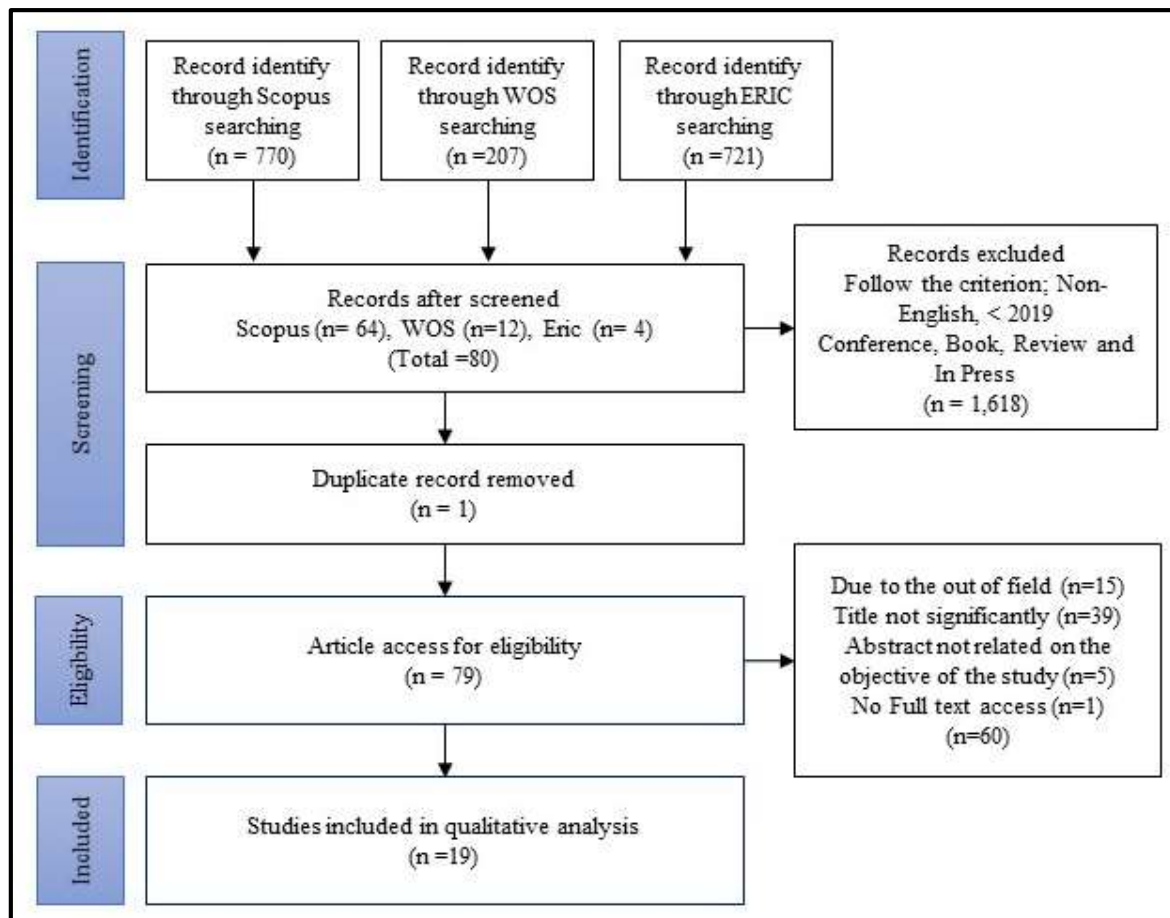
Table 2: The Selection Criteria Involve Searching.

Criteria	Inclusion	Exclusion
Language	English	Non-English
Time line	2020 – 2024	< 2019
Literature type	Journal (Article)	Conference, Book, Review
Publication Stage	Final	In Press

Eligibility

The final sample of the review is generated when all inclusion and exclusion criteria have been met. Providing readers with a comprehensive explanation of each research item in this sample is essential as it clarifies the specific research items that generate the study's conclusions. At the eligibility stage, 79 articles were subjected to a comprehensive assessment. The title, abstract, and primary text of each article were thoroughly reviewed to verify compliance with the inclusion criteria and relevance to the study's objectives. This phase concentrated on identifying papers that provide empirical data directly associated with digital skills as determinants of success in TVET entrepreneurship education. As a result, 60 papers were removed for insufficient alignment with the study goals. As seen in Figure 1, a total of 19 papers were chosen for the review, ensuring a thorough and methodologically sound sample to answer the study objectives.

FIGURE 1: Flow diagram of the proposed search process.



Data Abstraction and Analysis

This study employed integrative analysis to investigate and consolidate various research strategies, emphasizing quantitative approaches. The investigation aimed to identify significant themes and subthemes via a systematic data examination. The creation of the theme started with a thorough analysis of 19 articles, concentrating on the main ideas and conclusions on digital skills as success determinants in TVET entrepreneurial education. To make sure the methods and findings were in line with the goals of the study, a thorough assessment of the process was required. Co-authors worked together to assess the data, settling disagreements and refining themes to make them consistent. Supporting the analysis was a systematic recording of evaluation viewpoints, difficulties, and concepts pertaining to data interpretation.

The authors conducted iterative reviews and cooperative conversations to find recurring patterns and important discoveries. Conceptual differences were resolved through organized discussions, maintaining the theme framework's consistency and compatibility with the study's aims. Consistency in theme development was preserved through iterative adjustments, guaranteeing alignment with the study's objectives. The concluding themes establish a comprehensive framework for comprehending the significance of digital skills in the efficacy of TVET entrepreneurial education, supporting the study's results and suggestions.

Quality of assessment / Appraisal of Quality

Five experts with more than a decade of expertise in digital skills, TVET education, and entrepreneurial education were chosen to evaluate and authenticate the 19 papers. The assessment included three components from the Critical Appraisal Skills Program (CASP) checklist to evaluate research quality (Long et al., 2020). The quality evaluation concentrated on three criteria: exceptional, good, and moderate. Each manuscript was assessed according to explicit research aims, appropriateness of methodology, study design, data collection, analytical approaches, specificity of findings, and relevance of the research (Hassan et al., 2021). These criteria ensured a comprehensive evaluation of the methodology's accuracy and significance to the study aims. Table 4 summarizes the comprehensive quality assessment of the 19 papers to verify their conformity with the study objectives. This comprehensive evaluation established a strong basis for including high-quality data into the study's conclusions.

Result and Finding

Due to the rapid development of digital technology, incorporating digital skills into TVET entrepreneurial education has become essential for educating graduates to succeed in the highly demanding employment environment. This research identifies essential insights into incorporating digital skills into TVET entrepreneurship education, underlining the significance of teaching students these abilities to prepare them for the changing employment market better. Digital skills have become increasingly important as educational institutions realize that graduates must be technically proficient and entrepreneurially oriented. The findings of this in-depth study highlight the critical need for TVET institutions to modify their course offerings to incorporate comprehensive digital skills training. This will give students the abilities they need to survive in a global marketplace powered by technology. Nineteen (19) articles were chosen for selection and analysis based on the used search method. Table 4 presents the results of the categorization of all of the articles into three major themes: (1) digital competence (seven articles), (2) digital education and training (seven articles), and (3) entrepreneurial development (five articles).

TABLE 4: The Research Article Finding Based on the Proposed Searching Criterion

THEME 1: DIGITAL COMPETENCE					
No.	Authors & Year	Title	Journal	Methodology	Finding and Advantages
1	Suhartini et al., 2023	Identification of Constraints to Implementation of Entrepreneurship Digitalization Training: The Case of Batik SMEs In Indonesia	International Conference on Studies in Education and Social Sciences	Used a qualitative approach with participants comprising batik SME owners, managers, government representatives, and customers in Ciwaringin, Cirebon, West Java, Indonesia. Validity and reliability were ensured through a triangulation approach involving SMEs, government, and customers.	The research identified four key factors- digital knowledge, digital skills, management commitment, and government support-as critical to improving the sustainable performance of SMEs. Batik SMEs must prioritize these aspects and actively participate in digital entrepreneurship training. Proactive engagement with digitally inexperienced individuals was also emphasized as a pathway to success.

THEME 1: DIGITAL COMPETENCE

No.	Authors & Year	Title	Journal	Methodology	Finding and Advantages
2	Zeidmane & Vintere, 2021	A Case Study of Students' Views on the Digital Skills Needed for the Labour Market	International Conference on Cognition and Exploratory Learning in Digital Age (CELDA 2021)	A questionnaire was developed and administered to students at the Latvia University of Life Sciences and Technologies (LLU) to assess their views on necessary digital skills and opportunities for improvement. A comparative analysis was conducted among various faculties.	Key digital skills for the labour market include information use, evaluation, and access. Students in agricultural engineering and forestry programs reported the lowest skills, while IT students scored the highest. Recommendations include updating the "Informatics" course and integrating digital skill development across all study courses.
3	Momanyi et al., 2024	Digital Skills and the Use of Digital Platforms in the Informal Sector: A Case Study Among Jua Kali Artisans in Nairobi in Kenya	International Journal for Research in Vocational Education and Training (IJRVET) 2024.	The study used questionnaires, interviews, and observations to collect data from Jua Kali artisans and Nairobi residents who engaged artisans within six months.	The majority (86.3%) of Jua Kali artisans acquired skills through apprenticeship, with formal education linked to the adoption of digital platforms for business management. A significant relationship was found between education levels and digital platform use, emphasizing the importance of formal education in enhancing business efficiency.
4	Barboutidis & Stiakakis, 2023	Identifying the Factors to Enhance Digital Competence of Students at Vocational Training Institutes	Technology, Knowledge and Learning	The study used laboratory tests and parametric analyses (t-test, one-way ANOVA, Bonferroni correction) to identify factors influencing digital competence among vocational training students.	Factors such as age, educational level, specialization, PC and smartphone use, and internet usage significantly impact various DigComp areas, including communication, content creation, and problem-solving. Recommendations include updating curricula and implementing targeted courses to address specific digital skills and influential factors.
5	Kryukova et al., 2022	Adaptation of higher education students' digital skills survey to Russian universities	Eurasia Journal of Mathematics, Science and Technology Education	Exploratory and confirmatory factor analyses were conducted on survey data from 463 university students.	Six factors; digital content management, digital empathy, use of digital tools, digital safety, communication of digital content, and content creation were identified. The validated survey offers a reliable tool for assessing students' digital skills and can be adapted for use in diverse cultural contexts.
6	Záhorec & Kuruc, 2023	Testing of Digital Skills of Students and Teachers in Slovakia	European Journal of Contemporary Education	Analysed data from the eleventh cycle of digital skills monitoring in Slovakia, comparing test results of pupils, students, and teachers across different years.	Slight improvements were noted in basic digital skills and IT knowledge among participants, though some results remained consistent with previous cycles. Teachers identified areas needing improvement to meet teaching demands, highlighting the need for continuous digital skills development.

THEME 1: DIGITAL COMPETENCE

No.	Authors & Year	Title	Journal	Methodology	Finding and Advantages
7	Bachmann et al., 2024	What makes for future entrepreneurs? The role of digital competencies for entrepreneurial intention	Journal of Business Research	A time-lagged dataset from MOOC participants was analysed to test the effect of digital competencies on entrepreneurial intention, mediated by entrepreneurial orientation and self-efficacy.	Digital competencies positively influence entrepreneurial intention, but only through mediation by entrepreneurial orientation and self-efficacy. This highlights the need to integrate entrepreneurial mindset development with digital skills in education and practice.

Theme 2: Digital Education And Training

No.	Authors & Year	Title	Journal	Methodology	Finding and Advantages
1	Azanza et al., 2024	Empowering University Lecturers in the Digital Age: Exploring the Factors Influencing the Use of Digital Technologies in Higher Education	Education Sciences	Data from 294 university lecturers were collected via questionnaires and analysed using descriptive statistics, correlations, and multiple linear regressions.	Positive attitudes and appropriate training significantly enhance lecturers' self-efficacy in using digital technologies (DTs). Higher self-efficacy correlates with greater interest in adopting DTs, highlighting key factors to encourage successful DT integration in teaching practices.
2	Raveica et al., 2024	The Impact of Digitalization on Industrial Engineering Students' Training from the Perspective of Their Insertion in the Labor Market in a Sustainable Economy: A Students' Opinions Survey	Sustainability (Switzerland)	A survey with closed- and open-ended questions was conducted among 155 industrial engineering students, followed by statistical analysis of the responses.	The study emphasizes the need for curriculum updates with courses on emerging technologies, enhanced counselling on digital transition, upgraded university infrastructure, support for under-resourced students, and promotion of women's participation in STEM programs. These steps will foster competency-based learning and inclusive, quality education.
3	Peñate et al., 2024	The role of technological resources in the reputation of vocational education schools	Education and Information Technologies	Structural equation modelling was used to analyse data from vocational schools in Spain, focusing on technological resources, dynamic capabilities, and reputation.	Technological resources enhance schools' abilities to identify job market trends and bridge the academy-industry gap. Innovativeness directly improves reputation, while sensing capabilities require innovativeness for effective implementation. These insights guide vocational schools in leveraging technology for reputation building.

Theme 2: Digital Education And Training

No.	Authors & Year	Title	Journal	Methodology	Finding and Advantages
4	Lukashe et al., 2024	Synchronous online learning and career readiness in higher education: student perceptions, challenges, and solutions	Frontiers in Education	Qualitative in-depth interviews with 27 South African university students were analysed using thematic analysis to explore the impact of Synchronous Online Learning (SOL) on skill development.	Synchronous Online Learning (SOL) enhances technical skills and digital adaptability but lacks effectiveness in developing interpersonal skills and practical experience. Students highlighted limited networking opportunities and concerns about workforce preparedness. The study emphasizes integrating digital learning with strategies for soft skill and experiential development.
5	Müller & Leyer, 2023	Understanding intention and use of digital elements in higher education teaching	Education and Information Technologies	A quantitative survey was conducted among university lecturers to examine their intentions and actual use of digital learning elements.	Attitude, perceived norms, and behavioural control influence lecturers' intention to use digital tools, but an intention-behaviour gap exists. Familiarization with digital elements significantly impacts their actual usage. The study highlights the need for support in bridging this gap for effective digital integration.
6	Ranta et al., 2022	Entrepreneurship as a Neglected Pitfall in Future Finnish Teachers Readiness to Teach 21st Century Competencies and Financial Literacy: Expectancies, Values, and Capability	Education Sciences	Survey data was used to evaluate prospective Finnish teachers' expectancy values for teaching seven broad-based competencies outlined in the national curriculum, as well as their financial literacy.	Participants were interested in teaching all competencies but had poor self-efficacy and high perceived costs of teaching ICT and entrepreneurial skills. Self-efficacy in teaching entrepreneurial skills was associated to subjective financial capabilities and consumer skill confidence. Male and STEM instructors were more financially savvy. The findings emphasize the need for teacher training, digital technologies, and multidisciplinary collaboration to educate entrepreneurship, financial literacy, and workplace skills.

Theme 2: Digital Education And Training

No.	Authors & Year	Title	Journal	Methodology	Finding and Advantages
7	Pan et al., 2024	The Impact of Digital Competence and Personal Innovativeness on the Learning Behaviour of Students: Exploring the Moderating Role of Digitalization in Higher Education Quality	SAGE Open	Purposive and random face-to-face surveys acquired cross-sectional data from 1,569 Chinese students. Analysis used partial least square structural equation model.	Digital competency, personal innovation, and digital learning attitudes strongly affect student learning. Digitalization at higher education institutions moderates personality attributes and learning behaviour, boosting creativity and intelligence.

Theme 3: Entrepreneurial Development

No.	Authors & Year	Title	Journal	Methodology	Finding and Advantages
1	Irfan & Malik, 2023	The impact of successful intelligence, entrepreneurial personality, and social skills on sustainable entrepreneurship	Knowledge Management & E-Learning	Multiple regression on a five-point Likert scale was used to analyse a small and medium-sized business owner questionnaire on sustainable entrepreneurship.	Successful intellect and entrepreneurial mentality greatly predict entrepreneurial success, but cultural considerations do not affect social skills. The findings help businesses and governments improve sustainable business practices.
2	Sunday et al., 2024	Entrepreneurship skills framework for fostering the employability of industrial technology students	International Journal of Evaluation and Research in Education	A sequential exploratory mixed-methods approach with Rasch analysis using the partial credit model.	The study aims to create a functional, discipline-based entrepreneurship skills framework to enhance employability among Electrical Technology students. The framework addresses both specific entrepreneurship skills and the entrepreneurial mindset, contributing to socio-economic sustainability in Nigeria.
3	Abdul Wafi et al., 2023	‘Turning Job Seekers to Job Creators’: Talent Management Module Development for TVET Graduates	Journal of Technical Education and Training	A mixed-methods approach was used, including interviews with seven experts and quantitative content validation of the Talent Management Module (MTM) based on the Cognitive Information	The study developed and validated a Talent Management Module (MTM) with nine key variables, including entrepreneurial skills and digital technology. The MTM is designed to empower TVET graduates as job creators, addressing unemployment and fostering career adaptability and employability.

Theme 3: Entrepreneurial Development

No.	Authors & Year	Title	Journal	Methodology	Finding and Advantages
				Processing (CIP) theory.	
4	Sreejith & Sreejith, 2023	Exploring the Role of Cultural Capital, ICT Skills, and Entrepreneurial Self-efficacy in Shaping Entrepreneurial Intention among Women	Journal of Telecommunications and the Digital Economy	Structural Equation Modelling (SEM) was used to analyse data collected from female college students in India, utilizing AMOS and SPSS version 23.	The study found a positive relationship between cultural capital and entrepreneurial intention, with entrepreneurial self-efficacy serving as a mediator. ICT skills were shown to enhance cultural capital and entrepreneurial intention through entrepreneurial self-efficacy.
5	Kholifah et al., 2022	Designing the Structural Model of Students' Entrepreneurial Personality in Vocational Education: An Empirical Study in Indonesia	Journal of Technical Education and Training	Ex-post facto research with structural equation modelling (SEM) was conducted using path analysis and bootstrap methods on data from 597 vocational education students in Yogyakarta, Indonesia.	Digital literacy, interest in entrepreneurship, and self-efficacy significantly influence entrepreneurial personality. Entrepreneurial self-efficacy mediates the effect of digital literacy and entrepreneurial interest on entrepreneurial personality.

Discussion and Conclusion

This systematic literature analysis shows that digital skills are critical success factors in TVET entrepreneurship education. Digital competency, including technological proficiency, content creation, and problem-solving, significantly enhances entrepreneurial performance. TVET students with digital tools and platforms are better prepared to plan, operate, and scale their businesses, fostering flexibility and innovation in a competitive, technology-driven market. Integrating digital skills into entrepreneurship education enables students to remain relevant and adaptable in the evolving digital economy. A key finding is the importance of digital education and training. Experiential learning, case studies, and competency-based approaches effectively improve digital literacy among TVET students. However, challenges such as limited access to digital tools, insufficient infrastructure, and varying competency levels still need to be addressed. Economically disadvantaged areas highlight the need for equal access to digital resources, calling for state intervention to bridge these gaps.

Entrepreneurship development is another crucial area that combines digital literacy with entrepreneurial mindset development. Self-efficacy, creativity, and leadership must be integrated into TVET curricula to ensure students can translate digital skills into successful entrepreneurial outcomes. By merging digital technologies with entrepreneurial education, TVET graduates can contribute to economic growth while addressing challenges like unemployment and career readiness. Institutional support is vital to foster an environment conducive to digital learning. Educational institutions must invest in infrastructure, train instructors, and promote professional development. Building industry partnerships, enhancing collaboration platforms, and incorporating emerging technologies such as AI and data analytics into curricula are necessary to align TVET education with industry demands.

The role of continuous feedback and iterative curriculum improvement cannot be overlooked. Regular assessments involving educators, students, and industry experts can help identify gaps in training and ensure that programs remain aligned with evolving industry needs. By fostering a culture of lifelong learning and adaptability, TVET institutions can better equip graduates with the skills necessary to navigate the complexities of a rapidly changing digital economy.

In conclusion, this study highlights the need for a holistic approach to embedding digital skills into TVET entrepreneurship education. Addressing infrastructural challenges, refining teaching methodologies, and aligning curricula with market requirements is critical for producing resilient and innovative graduates. By equipping students with the necessary skills and fostering an entrepreneurial mindset, TVET institutions can prepare future-ready entrepreneurs capable of driving economic growth and navigating the digital economy. Policymakers, educators, and industry stakeholders must collaborate to achieve and sustain these objectives.

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