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A Thematic Literature Review on Industry-Practice Gaps in TVET

Abstract

Technical and Vocational Education and Training (TVET), as formal or informal education and training, is geared towards the development of skills that are aligned to the needs of the industry. However, there are mismatches or shortages in the developed technical skills of graduates with the industry's expectations. These are the industry-practice gaps. This study mapped these industry-practice gaps through a thematic literature review of the TVET practices. Moreover, the literature identified solutions for bridging the gaps. Twenty-five pieces of literature were reviewed, and MAXQDA was used to conduct inductive thematic analysis, resulting in the identification of major themes. The main themes in industry-practice gaps are transversal skills as determinants of TVET employability, mismatches and shortages of technical skills, and administrative support as an integral part of TVET systems. Those gaps can be bridged through curriculum development: impact of teachers and instructions, academe-industry collaboration as work-based learning, and seminars and training towards the demands of the industry. This study recommended that the findings may contribute to a better understanding of industry-practice gaps, which may aid in the development of sound TVET policies and guidelines.

Keywords: *industry-practice gaps, TVET practices, literature review*

1 Introduction

Technical and Vocational Education and Training (TVET) is a formal or informal education and training process that emphasizes the acquisition of practical or technical skills to enhance workplace learning and develop an individual's occupational abilities. UNESCO (2003) defines TVET as the acquisition of practical skills, attitudes, comprehension, and information related to vocations in a variety of sectors of economic and social life. As such, TVET has long been recognized as a critical component of human resource development (HRD) and a critical tool for socioeconomic development (Pavlova 2014; Pongo et al. 2014). Additionally, TVET can play a significant role in achieving the Sustainable Development Goals (SDGs) by 2030, including poverty reduction, expanding opportunities for lifelong learning, and creating jobs and decent work for all (Edokpolor & Owenvbiugie 2017; Paryono 2017; McGrath et al. 2018).

Still, there exist problems in the acquisition of technical skills among students and graduates of the TVET system. These are the industry-practice gaps that continue to persist in the system due to the changing landscape and needs of the industry. Industry-practice gaps refer

to the skill gaps among TVET graduates when they face the labor industries. These skill gaps were constituted by the lack or absence of transversal (Rosen et al. 2018; Sa-Nguanmanasak & Khampirat 2019), technical (Sidoo et al. 2017; Husain et al. 2020), and employability skills (Sidoo et al. 2017) needed in the industry.

Technical and Vocational Education and Training is intended to foster the development of skills that are particularly well-suited for identifying occupations (Agrawal 2012). Vocational education studies programs that prepare students to perform practical tasks effectively. According to Wapmuk (2011), it entails acquiring the skills and abilities necessary to function effectively in industrial and commercial occupations. Vocational education prepares students for the world of work by emphasizing vocational skills in its students. Aftab and Mohd (2012) noted that vocational education is critical in providing the skilled workforce required for a country's development. Individuals and the nation as a whole require skills for sustainable economic growth. As a result, vocational education has emerged as one of the most effective human resource development strategies that countries must embrace to train and modernize the technical workforce required for industrialization and national development. Similarly, vocational education is a critical component of any nation's economic development (Abdullahi 2011).

In the case of the Philippines, despite government efforts to revitalize vocational education at all levels, vocational education graduates continue to lack essential workplace skills such as occupational and employability skills. Individuals are considered employable when they have acquired the employability skills components through quality education and training (Asian Development Bank 2021).

According to Alinea (2013), university-educated technical graduates lack the critical skills required of an entry-level technician. There is a significant disconnect between the industry's expectations of technical graduates and their acquired skills. As a result, additional financial resources are required to provide necessary training and skill development for newly hired industry workers. According to Radermacher et al. (2014), an increasing number of technical students lack the abilities, knowledge, and skills necessary to perform the tasks they will eventually perform in the field. A lack of these abilities and skills can prevent an individual from being productive or finding work. Globally, the skill gap is also a growing concern (Cappelli 2014). In recent years, widespread complaints have been made about the disparity between industry skill requirements and graduates' skills in school. Cappelli (2014) added that the industry frequently conducts interviews with employers who claim they cannot fill open positions. Numerous independent organizations, individual businesses, and business associations have also looked into skill shortages. During that period, the applicant pool, most of whom have recently been employed, outstripped available job opportunities. The evidence for this unemployment is not in the places where labor market experts expect it to be, such as rising wages. Employers who report having difficulty hiring workers provide the data. Graduates struggle to find work because they lack the technical skills that are supposed to be acquired during their college years (Bureau of Labor Statistics 2014).

In light of the premises mentioned above regarding industry-practice gaps, this study compared several pieces of literature in technical-vocational education that highlighted practices that are vital in improving the TVET field. Industry-practice gaps were identified and the solutions arose in the existing literature.

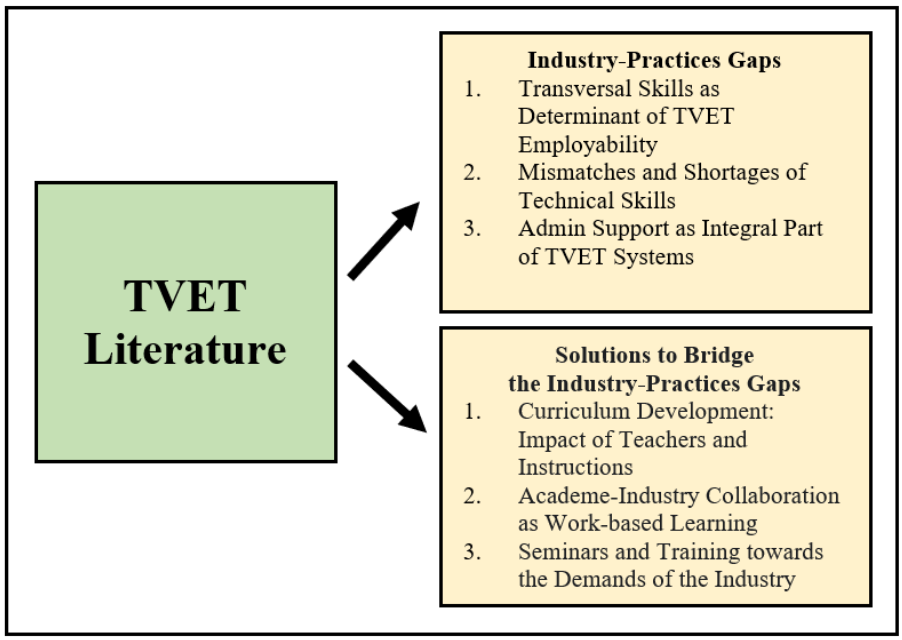

Figure 1: Conceptual Framework of the Study

Figure 1 illustrates the framework for conducting this study. The primary data source for this study is the TVET literature. Twenty-five (25) articles were analyzed to identify industry-practice gaps. Gaps were identified through inductive thematic analysis. The industry-practice gaps identified in the analysis of the available data are transversal skills as determinants of TVET employability, mismatches and shortages of technical skills, and administrative support as an integral part of TVET systems. Solutions to bridge the gaps were also arising in the literature, these are curriculum development: impact of teachers and instructions, academe-industry collaboration as work-based learning, and seminars and training towards the demands of the industry.

2 Objectives

The purpose of this study is to thematically review the literature published in the field of TVET that pertains to industry-practice gaps. Specifically, the following are the research questions:

- What are the industry-practice gaps arising from the TVET literature?
- What are the solutions that emerge to address the industry-practice gaps?

3 Methodology

MAXQDA was used to conduct inductive thematic analysis for this study. Thematic analysis was chosen because it is adaptable, does not require a thorough theoretical and technological understanding of techniques, and is more accessible (Braun & Clarke 2006). The literature review was conducted in exploratory mode, where the search strategy is flexible and contributes to the themes in the literature. The exploratory design was chosen over the explanatory design because the purpose of this research is to compare the similarities and differences between the available literature from the perspective of industry-practice gaps and the solutions to close those gaps. A literature review is not a qualitative method, but the approach used to analyze and evaluate the data in the literature review is qualitative (Synder 2019).

Figure 2 illustrates the flow diagram of the article selection process. Forty-three (43) articles were identified as initially potential from various TVET journals. Among those, thirty-one (31) articles were accepted during the initial screening, and twenty-five (25) articles were chosen based on a variety of criteria. The following criteria were used: a) published between January 2010 and December 2021; b) incorporate the concept of responsiveness in the TVET industry, and; c) published in the English language. The review also focused on solutions for bridging industry-practice gaps. The articles were culled from a variety of databases, but the majority originated in the Journal of Technical Education and Training. These complete articles are freely available online, and purposive sampling was conducted using the keywords 'industry gaps,' 'industry-practice gaps,' 'industry practices,' 'TVET industry,' and 'skills gap.' The search is conducted by title, abstract, and keywords followed by the exclusion of articles that are only abstracts and have no bearing on TVET (Handa et al. 2016).

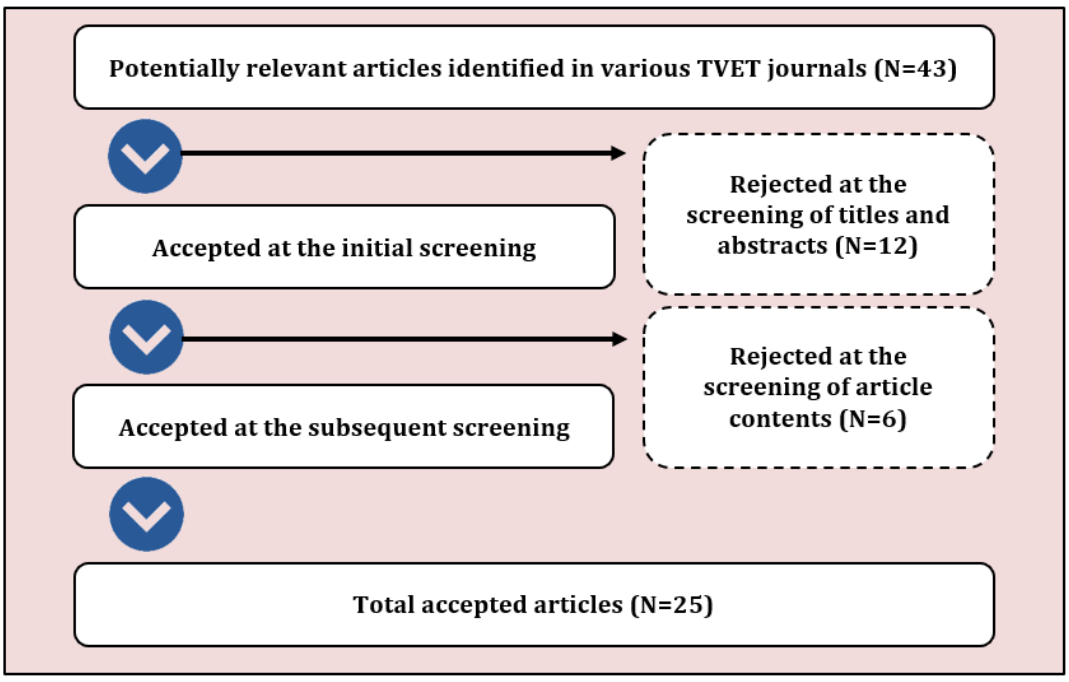

Figure 2: Flow Diagram of the Article Selection Process

The data in this study were analyzed using Braun and Clarke's thematic analysis, which included six phases of the inductive thematic coding process (Braun & Clarke 2006). As illustrated in Figure 3, a review of the literature was conducted. Reading and rereading the textual data made thematic coding possible. Data familiarization and writing of memos are vital in the coding process.

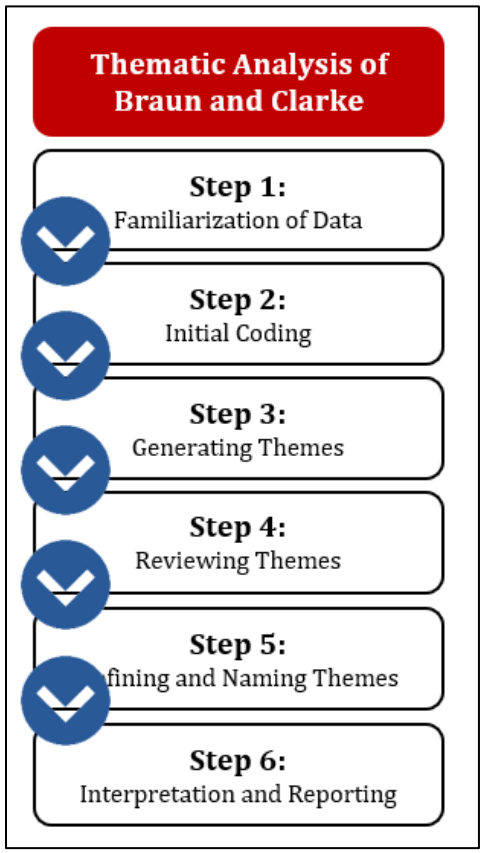

Figure 3: Braun and Clarke Thematic Analysis

Step 1 involved conducting a literature review – repeated reading of textual data and the creation of a memo during the coding process. In step 2, two codes were used to generate the initial codes via the inductive coding process. The first type of code is known as industry-standard gaps. The second section contains the solution code for addressing the gaps. Following that, in step 3, each was defined to facilitate the identification of potential themes based on the primary codes. The term "industry-practice gaps" refers to the discrepancy between the skills (soft or hard) acquired by students or graduates of a TVET system and the industry's required skills. This may also be referred to as the student's lack of or mismatch between the skills that should have been developed during their TVET years and the skills required by industry. The second code denotes the solutions for addressing the identified gaps in industry practices.

Following that, in step 4, the potential themes were evaluated. Numerous pattern codes for possible themes were identified inductively based on the similar pattern identified during the

initial coding. Certain codes were combined, while others were placed under a mother code due to their similarity in the pattern. Following that, in step 5, these themes are refined and defined. Numerous themes are classified as sub-themes since the responses do not directly address the central questions.

Braun and Clarke (2006) defined the final stage as the creation of a report. This report is included in the succeeding section of this study.

4 Results

The following results were drawn from the inductive thematic analysis:

4.1 Industry-Practice Gaps

4.1.1 Theme 1: Transversal Skills as Determinants of TVET Employability

Transversal skills are most commonly known as soft skills. Surprisingly, the leading industry-practice gap emerging from the TVET system is not the lack of technical skills but rather the lack of transversal skills. UNESCO (2019) defines transversal skills as "Skills that are typically considered as not specifically related to a particular job, task, academic discipline or area of knowledge and that can be used in a wide variety of situations and work settings (for example, organizational skills)." These are also referred to as 'soft' or 'transferrable' skills since they are not industry- or job-specific. The term 'transversal' refers to how these abilities' cut across' various tasks and roles, analogous to a transversal line in geometry.

According to the TVET literature being reviewed, the most frequently lacking transversal skills among TVET students and graduates are strong quantitative and analytic abilities, creativity and proficiency in solving complex problems, and effective interpersonal communication (Ismail et al. 2018; Husain et al. 2020). There is an increasing demand for workers who combine strong analytical abilities with non-cognitive abilities in areas such as teamwork (Mtshali & Ramaligela 2020; Lazareva & Kovtun 2018) and collaboration (Rosen et al. 2018).

Rosen et al. (2018) added that employers have repeatedly emphasized the importance of employees possessing strong career-readiness skills (also known as twenty-first-century skills, soft skills, and employability skills): the general habits and competencies that contribute to an employee's effectiveness, such as the ability to arrive on time for work and work cooperatively with others (Siddoo et al. 2017). Numerous programs now emphasize the development of students' interpersonal and non-cognitive abilities, such as empathy, adaptability, and communication, as well as their ability to solve problems. Demand for these skills is expected to increase in the future.

Additionally, mentors observed that TVET students lacked the most fundamental communication skills; similarly, communication skills were rated lower than other skills. This finding corroborates with Abdullah and Majid (2013), Mutalib et al. (2014), and Ting et al.

(2017) that TVET students lacked the required English proficiency and communication skills for workplace communication. According to Yasin et al., they are unable to communicate effectively in English and lack confidence when presenting orally. Numerous employers in Thailand have stated that communication skills are a necessary job competency (World Bank 2014). Nonetheless, Bateman and Coles (2017) concluded that the majority of Thai TVET students lack this ability, particularly in the area of English proficiency. In several countries, including Thailand and Malaysia, the high unemployment rate among recent graduates is frequently attributed to their lack of English proficiency and communication skills (Sa-Nguanmanasak & Khampirat 2019; Ting et al. 2017).

For example, in Civil Technology, one of the most critical skills is problem-solving, as learners are expected to solve technological problems. Teachers are well aware that students require practical skills to solve technological problems. Kirlbrink and Bjurulf (2012) argue that any technical education subject has historically been based on an apprenticeship system, which means that craftsmanship, vocational trades, and other skill domains all require problem-solving (Mtshali & Ramaligela 2020).

Teachers agreed that equipping students with transversal skills would make them more adaptable in the workplace. Learners should demonstrate an understanding of the industry to make connections to life outside the classroom and address real-world challenges (Department of Basic Education 2019). This is consistent with Smith and Tyler's (2011) observation that teachers tend to create a work-based environment when teachers teach practical lessons. Autio et al. (2015) concur, asserting that learners must solve contextual technological problems, lowering the cost of skills export in various communities.

Suarta et al. (2018) clarified that seven types of skills are included in generic or transversal skills. These include interpersonal communication, teamwork, problem-solving, creativity and innovation, leadership, self-management, and learning skills. These are also called employability skills (Abd Samad et al. 2018; Haron et al. 2019; Hassan 2013). Since these skills are industries' important needs, this issue warrants attention. Employers have ranked these skills as highly important.

The framework for providing industrial training to TVET students to improve the quality of transversal skills should be strengthened. As a result, related authorities should plan and make continuous improvements to assist students in meeting their prospective employers' requirements for generic or transversal skills (Ghazalan et al. 2019).

4.1.2 Theme 2: Mismatches and Shortages of Technical Skills

The primary objective of the TVET system or schools is to equip students with technical skills that they can apply in the workplace. These are the skills, abilities, and knowledge necessary to perform specific job-related tasks. In TVET, these may be the ability to do welding jobs, tile setting, masonry, machining, etc. While there is broad agreement on these current employment trends, economists disagree on the source of the shortages and have divergent long-term labor market projections. According to some, current shortages result

from a skills gap, in which workers lack the technical skills required by employers (Rosen et al. 2018).

Numerous studies conducted over the last decade have revealed gaps between industry expectations and university graduates' skills and abilities (Aničić & Arbanas 2015; Royle & Laing 2014; Radermacher & Walia 2013; Collet et al. 2015; Siddoo et al. 2017). There are discrepancies between employers' expected and actual performance of students. These findings corroborate Radermacher and Walia's (2013) findings that, in addition to personal and professional skills, the quality of technical skills was a critical competency.

The study of Husain et al. (2020) regarding the mismatch in supply and demand of building surveying graduates revealed that the top reason for the mismatch is students' lack of technical skills and knowledge. On the same footing, attention should be given to raising concerns on whether the learners are equipped with responsive industrial knowledge and skills when they graduate (Mtshali & Ramaligela 2020). This finding, however, is consistent with Makgato's (2011) finding that the majority of technology education teachers continue to struggle to impart the skills necessary to ensure that learners are employable upon graduation. Additionally, learners may require additional training after high school graduation if the content they learned does not provide them with an industrial advantage. Therefore, TVET schools must strive to develop learners' skills to the point where they can immediately enroll in a career pathway at a college or university after obtaining their diploma (Department of Basic Education 2011).

4.1.3 Theme 3: Administrative Support as an Integral Part of TVET Systems

Administrative support, whether on the school level or national level, is important in the continuous development of TVET systems. The absence of such will indeed create industry-practice gaps. Administrative support includes a positive working environment among teachers, especially on teacher development, sufficient facility and equipment, improving vocational training approaches, collaboration with industries, working hand-in-hand with parents, and a limited budget.

In practice, it is simply too challenging to implement effective TVET in developing countries, particularly low-income countries, due to a lack of funding for equipment and supplies, and particularly for adequately trained instructors. Additionally, they lack the administrative capacity necessary to deliver quality TVET. Governments are typically less competent than the private sector at managing institutions (Asian Development Bank 2009).

Vocational education is difficult to implement effectively. It necessitates specially trained instructors, preferably with real-world experience teaching the skills being taught. Teachers with those credentials are difficult to recruit and retain. Additionally, vocational education necessitates administratively complex coordination of inputs.

To ensure that a TVET system can function effectively, it is critical to ensure that an enabling and TVET-friendly environment exists throughout the country. This enabling environment

can be created by implementing consistent national TVET policies, allocating adequate funding, fostering positive social attitudes toward training, and improving management. Increased public funding will result in increased subsidies to low-income households in the form of loans and scholarships for deserving trainees. Enhanced management should ensure the coordination of TVET. This will reduce resource waste and increase the relevance and retention of the country's training personnel. Managing TVET through various government departments has resulted in the stagnation of the TVET sector and the emergence of disparities in training standards in the majority of Developing Countries (Wahba n.d.).

The unavailability of resources contributes to industry-practice gaps (Amu & Offei-Ansah 2011). Facility and equipment are necessary to develop technical skills among TVET students (Manap et al. 2017). According to Amu and Offei-Ansah (2011), even transportation is an administrative concern. TVET schools in developing countries should ensure that students are transported to and from industrial sites during regular school hours. Similarly, excursions and field trips to industrial sites will help establish connections between TVET schools and industry, thereby equipping graduates with marketable skills. This is as well an administrative concern.

Additionally, the absence of administrative structures in the form of industrial liaison undermines TVET's ability to establish links with industries that can train students. This is confirmed by the findings of Amu and Offei-Ansah (2011), who discovered that a large majority of respondents (98.3 percent) believe liaison officers can assist in connecting industries and institutions. Administrative support can also be defined as the appointment of qualified experts from 4IR industries to assist in developing TVET. Their participation is critical. They must send the appropriate personnel to ensure that the industry's requirements are met. Administrative support that will create collaboration among TVET schools and industries is vital in creating competency standards relevant to the needs of the industries (Sohimi et al. 2019).

4.2 Solutions to Bridge Industry-Practice Gaps

4.2.1 Theme 1: Curriculum Development: Impact of Teachers and Instructions

Curriculum development is comprised of several layers. It is a cyclical process that involves planning, designing, implementing, and evaluating. The intended curriculum should be appropriately implemented to be aligned with what should be achieved in the teaching and learning process. The curriculum plays a significant role in the success of the school system; thus, the same is needed for TVET.

Mohamad et al. (2021) mentioned in their study that during academe and industry collaboration, developing a curriculum in the right way is vital for the industry to know. Often, employees were trained solely based on the experience and expertise of senior staff instructors, without receiving adequate guidance on developing and evaluating their curriculum. They can develop their curriculum, improve existing curriculum, and organize

training evaluations with their knowledge of curriculum development. The persistent industry-practice gaps in different countries can then be bridged by aligning the curriculum competencies to what is expected of the industries.

The most critical area in which universities can assist in bridging skill gaps is educational reform. The curriculum is influenced by employers' and the labor market's rapidly changing needs. As a result, it is critical to adapt the curriculum to employers' and the labor market's rapidly changing needs. This can be effectively carried out when there is a joint review and formulation of curriculum between the academe and the industry (Ayonmike & Okeke 2016). The purpose of collaborating with industry, according to Callan and Ashworth (2004), is to develop the vocational education curriculum. A positive relationship between the university and industry enables students to be placed in training and provides case studies to supplement the curriculum. Additionally, several policies facilitated states' integration of technical skill development into their K-12 systems. For instance, states' accountability systems may include indicators relating to career and technical education (Rosen et al. 2018).

Employers expected students to be self-sufficient and knowledgeable about their field of study. This finding is consistent with a study conducted in the Croatian information technology industry, where researchers discovered a disconnect between curriculum content and industry needs (Aničić & Arbanas 2015). The study found that the required competencies of teamwork, communication, and language ability were not being met (Siddoo et al. 2017). According to Sohimi et al. (2019), there is a need to increase industry participation in curriculum development, teaching, and learning.

Modules should be developed with industry input and should adhere to the prescribed syllabus and industry requirements to prepare vocational college graduates for employment in the industry. Additionally, industry involvement can expose students to real-world industrial conditions (Manap et al. 2017). The curriculum empowerment should also lay the way to enhance both skills, transversal and technical. Academic institutions are under increased pressure to develop their students' technical and soft skills. Thus, the educational institution must look back on the syllabus, the process, and the methodology used to prepare students for the upcoming industrial revolution.

Additionally, Saari et al. (2021) concluded that the institution must provide students with a clear career path or framework to ensure they graduate with a sense of purpose. It is possible to tune, shape, and develop all students' creativity and soft skills through well-designed training programs. This is critical to ensuring that a sufficient number of skilled workers with a mix of technical and soft skills is produced to meet the demands of the fourth industrial revolution.

As part of the curriculum development process, the implementation of the curriculum is also a vital strategy in bridging the industry-practice gaps. Teachers, lecturers, and instructors should be competent in technical, transversal, and pedagogical skills. They are responsible for imparting knowledge, skills, and an appropriate attitude to the students they train.

Opportunities for growth, such as research and publication of research findings, are integral to a teacher's responsibility. Japan International Cooperation Agency's (2008) research on technical and vocational education, as cited by Alam et al. (2009), confirms the TVET institutions' mandate to educate and produce highly skilled technicians, managers, and engineers. These efforts are aimed at facilitating Ghana's industrialization, and lecturers and instructors are obligated to carry them out. Additionally, technical teachers must teach, conduct research, and provide community service. Moreover, they are responsible for training, counseling, and serving as role models for these students promoting professional competence and upholding academic standards and excellence (Amankwah & Swanzy 2011; Stephens 2015).

Training institutions have a critical role in enabling lecturers and students to promote teaching and learning by providing necessary facilities. This is called the support curriculum. Additionally, Alam et al. (2010) argued that management should collaborate with appropriate organizations to assist in developing students' competencies through industrial attachment and, finally, to provide the necessary support for staff development and training. Without proper execution of these roles by training institutions following curriculum requirements, it is unlikely that the goal of developing required competencies among students will be achieved. Building the appropriate competencies among students will be effective only if the process is identified and implemented. When little or no attention is paid to identifying and applying the essential competencies required by industries and self-employment, training is unlikely to develop the necessary job market competencies. TVET will endure the test of time if all stakeholders play their roles effectively (Amankwah & Swanzy 2011).

4.2.2 Theme 2: Academe-Industry Collaboration as Work-Based Learning

Collaboration in all forms of endeavors is helpful. Much is the same with strengthening the tie between the academe and industry to minimize the gaps. Industry partners believed that the quality of their relationships with training institutions was critical to developing the skills and knowledge required to close the gap (Callan & Ashworth 2004). Collaborations between vocational education providers and industry that are successful are also critical to the national economy (Ayonmike & Okeke 2016; Pagtakhan & Rock 2002).

One recurring theme of recommendations for improvement was the importance of collaboration with the industry. Institutions are encouraged to collaborate with the industry to stay current on industry best practices and technological advancements. Occasionally, the books to which students refer to acquire knowledge may be outdated to the point where they are no longer applicable. This way, lecturers can ensure that the syllabus is aligned with industry needs, resulting in work-ready graduates. As a result, students and lecturers should not rely solely on their reference books. They must collaborate closely with the industry to keep their knowledge, course content, and instructional materials current. Collaborating with industry is the best course of action for skill-based institutions. Thus, the industry is the source, the origin, of technology. Inputs from industry are required for TVET schools to produce industry-ready students or graduates (Ramamuruthy et al. 2020; Oloruntegbe 2010).

These findings were supported by Adetokunbo (2009), who proposed an outline for a framework for fostering university-employer collaboration. While there are some areas of positive interaction between universities and employers, such as training programs and joint services to close skill gaps, a framework is needed to address the labor market's chronic skill shortages (Ayonmike & Okeke 2016). Personal characteristics and knowledge are critical dimensions that employers expect students to develop during their university education, so universities must understand the needs of the industry to meet them. Information technology is a profession that cannot be taught through textbooks. Universities are expected by organizations to fulfill their responsibilities by preparing students for the realities of the information technology industry (Breivik 2005). Universities must collaborate with industry to understand the actual demands of the information technology industry to produce graduates who meet those needs (Collet et al. 2015; Aničić & Arbanas 2015; Radermacher & Walia 2013; Siddoo et al. 2017; Royle & Laing 2014).

Siddiky & Uh (2020) developed the framework, as shown in Figure 4, for mutual collaboration between academe and industry.

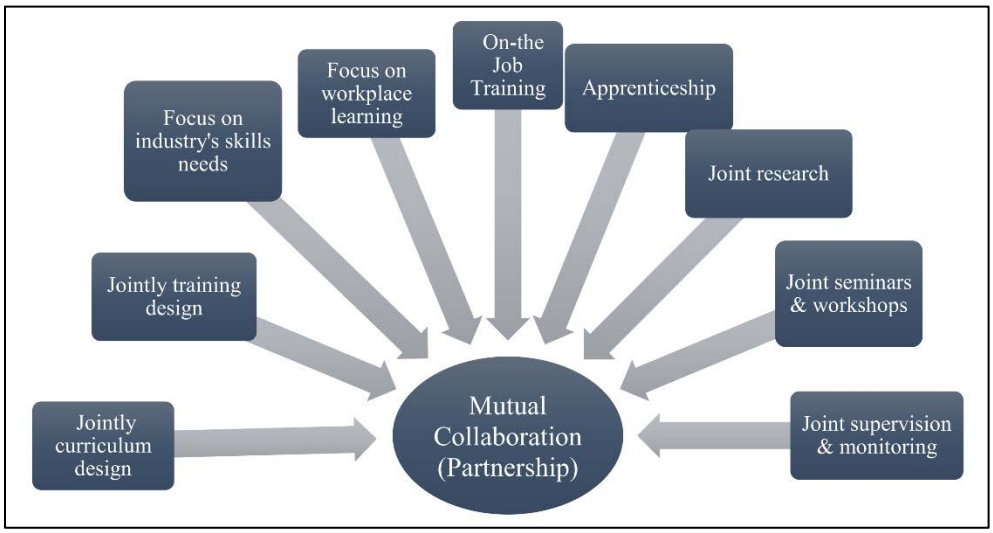

Figure 4: Framework for mutual TVET industries and institutions' collaborations

Research also found that throughout the collaboration between educational institutions and the industry in work-based learning, the sharing and transferring of knowledge took place. The expertise of skilled, qualified, and experienced technical people working in the industry can be shared to balance theoretical knowledge and practical skills (Mohamad et al. 2021). Workplace partnerships can be beneficial, like sharing laboratory, workshops, and personnel (Ayonmike & Okeke 2016) and skills, knowledge, facilities, and funding (Sohimi et al. 2019).

Additional strategies for closing the skills gap among vocational education graduates in Nigeria include joint assessment of students' abilities by industries and TVET institutions and

joint certification of students (Ayonmike & Okeke 2016). Designing an assessment of industrial training with employers will be handy in aligning the competencies with the standards (Sohimi et al. 2019). Azmi et al. (2020) stated that there is no issue with using rubric forms and logbooks for assessments. Industrial visits by lecturers are critical and should not be overlooked. According to Khairiyah et al. (2018), refusing an industrial visit by a university will have an impact on the communication link or relationship that exists between universities and industries. When it comes to budget constraints for industrial visits, the high cost of the visit will have an impact on the supervisors' evaluation of the visit. The industrial visit is critical to ensuring the industry's quality of assessment and supervision.

Furthermore, industrial visits could ensure that faculties maintain their relationships with industry to ensure that their subjects, syllabus, and curriculum remain valid and relevant in the face of industry changes (Noordin 2014). The relationship between academia and industry is critical for projects involving innovation and commercialization (Vaaland & Ishengoma 2016; Schiller 2006). Proper supervision is essential for ensuring that students receive the required knowledge during industrial training.

4.2.3 Theme 3: Seminars and Training Towards the Demands of the Industry

Workshops, training, and seminars are the nitty-gritty of skill development. Training and retraining are critical components of any academic institution. Training is the process of imparting knowledge and practice to someone to bring them up to a desired level of behavior, efficiency, or physical condition (Amankwah & Swanzy 2011). On the other hand, the length of training is the primary point of contention between universities and industry. Employers consistently request a more extended training period, either because they require additional time to train or because students require extra time to apply their knowledge. Employers stated that six months of training or a minimum of three months duration is appropriate for industrial training (Phang et al. 2014; Yusof et al. 2013). They reasoned that a lengthy training period would be more beneficial, providing trainees with additional exposure and allowing them to grasp the flow of a project. On the contrary, universities want to eliminate doubts about the quality of training provided to students who participate in more extended placements. Simultaneously, they wish to avoid manual labor tasks unrelated to technical and soft skills (Azmi et al. 2020).

Furthermore, universities accept any type of training given to students as long as it is relevant and appropriate. Students must apply their university-learned theory to real-world situations (Laguador 2013; Ogilvie & Homan 2012; Renganathan et al. 2013). Both parties agreed that students should understand how to interact with coworkers to acquire as many skills and experiences as possible. Moreover, they will most likely be tested in situations that require them to practice all relevant skills throughout the training (Rocha-Pinto 2013; Phang et al. 2014). Furthermore, work-based learning provides an excellent opportunity for students to develop self-awareness competencies; as a result, it has a positive impact on the development of decision-making skills, opportunity awareness, and transition learning (Jackson & Wilton 2016).

It is also advisable that academe and industry partnerships should also take the form of seminars and workshops. Aside from maintaining the link between the two, this step will also help TVET institutions be attuned to the latest skill demands of the industry (Amu & Offei-Ansah 2011). In some instances, TVET institutions invite experts from the industry to serve as speakers and trainers, at least once every semester, to share knowledge. This is to share experience-based knowledge that links theory and skills to practice in real situations. This gives TVET institutions an advantage in acquiring skills in line with the industry requirements (Mohamad et al. 2021; Ayonmike & Okeke 2016; Manap et al. 2017). Tiwari and Malati (2020) pointed out that existing skills can only be achieved by training.

It is also important to evaluate training, seminars, and workshops. The evaluation data can be used to plan effective training that is responsive to the needs of the industry. Whenever there are shortages or misalignment in the skills of TVET students or graduates, seminars and training can be the bandage to fill the gap. However, it should never be the case. Thus, seminars and training that are relevant and responsive should be given to the students while they are in the TVET institutions to develop their transversal and technical skills better.

5 Discussion

The findings of the literature review on TVET practices revealed themes regarding industry-practice gaps. Industry-practice gaps involved the transversal skills as determinants of TVET employability, mismatches and shortages of technical skills, and administrative support as an integral part of TVET systems. These gaps can be addressed by the arising themes namely curriculum development: impact of teachers and instructions, academe-industry collaboration as work-based learning, and seminars and training towards the demands of the industry.

Industry-practice gaps are present in various studies. Aside from the lack of quality technical skills, TVET students and graduates lack the necessary transversal skills and employability skills that keep them on the job (Rosen et al. 2018). The effect of the 4th industrial revolution keeps the TVET system focused on technical skills and missed out on equally important human skills. However, there is still an increasing mismatch between the technical skills of graduates and the needs of the industry. Both technical and transversal skills must be developed among TVET students/graduates. Moreover, the lack of administrative support in the TVET system aggravated the industry-practice gaps. Without it, the infrastructure, the facilities, industry linkages, the teachers, and the students can never reach the destination for a better TVET.

But TVET is working on how to address the industry-practice gaps. First, it will be effective to start with the curriculum. The planned curriculum should be aligned with the industry requirements, and collaboration with the industry is a must (Mohamad et al. 2021). All the processes involved in curriculum development should be partnered with healthy collaboration with the industry. The industry partners should participate in curriculum processes like planning, designing, implementing, and evaluating. When these strategies are coupled with

joint efforts in training and workshops and sharing resources like laboratories, shops, and the like, industry-practice gaps will be alleviated.

Thus, even if there are existing industry-practice gaps, there are also solutions to bridge them. Though there are so many efforts in minimizing the gaps, still, those gaps pose challenges and problems that keep TVET from improving. The reality that TVET is the cradle of the workforce of any country is still the reality that can help countries be developed towards economic progression and stability.

Amidst digitalization brought about by the changes in the teaching and learning landscape, this reality increased the challenges that hinder the delivery of quality TVET to students. However, challenges are also opportunities for TVET to be adaptive to the changes. Having identified the industry-practice gaps, the findings of the study can serve as springboards on where to start working.

To remain innovative and appealing, TVET must keep up with current technological developments and provide learners with new digital skills and competencies. Curricula and training regulations must be updated regularly to cover new skills and competencies, as well as changes in teaching methods. As a result, TVET teachers must be aware of new and evolving digital trends and tools in order to effectively teach them to students.

With that, UNESCO-UNEVOC (2019) has identified strategies for capitalizing on opportunities created by digitalization trends. These strategies include proactive curriculum and training regulation updates to keep pace with new digital developments, close collaboration between businesses and schools to address digitalization trends and ensure that learners develop relevant digital skills, providing TVET teaching staff with digital skills training and advanced tools and learning materials, and preparing learners for advanced technology use to make TVET relevant to the labor market needs.

Tech-voc education undoubtedly represents a viable and sustainable option for assisting individuals in reaching their full potential as contributors to the economic growth and development of the country. The Philippines' and ASEAN region's tech-voc education landscapes point to a promising leap toward opportunities not just for personal and professional advancement but also for nation-building. Programs associated with technical-vocational education can be redesigned and strengthened to make them more appealing as a career path because qualifications and standards are explicitly aligned with job and industry requirements. Additionally, education and training are considered responsive to stakeholders, the enterprise, and the future industry with these qualifications. Tech-voc can also be an avenue for collaboration within countries as a mechanism for diplomacy and cooperation (Ancho & Prima Dewi 2021).

6 Conclusions

The following conclusions were drawn from this exploratory research via a review of the literature:

- The arising industry-practice gaps in TVET literature are transversal skills as determinants of TVET employability, mismatches and shortages of technical skills, and administrative support as an integral part of TVET systems. These gaps are important indicators that help assure quality TVET practices in terms of skill delivery to students, thereby, supplying quality graduates equipped with skills that are industry responsive.
- The solutions emerging in TVET literature for industry-practice gaps include curriculum development: impact of teachers and instructions, academe-industry collaboration as work-based learning, and seminars and training towards the demands of the industry. The involvement of the various stakeholders in all of the processes of curriculum development is vital in addressing the industry-practice gaps in TVET. The identified solutions in this study are reliant on the comprehensive collaboration among the stakeholders that will navigate the curriculum so that relevant skills will be delivered to TVET students.

7 Recommendations

Concerning the findings of the study, this research recommends that they be used as baseline data in developing policies and guidelines that will assist in addressing the impending problems of the TVET system. Further research into the changing and updating nature of the industry should be conducted to keep TVET institutions up to date with the needs of the industry. TVET institutions may also utilize this study's findings to upgrade curricula that are often outdated and not aligned with industry standards. In addition, research that focuses on the efficient alignment of the TVET curriculum to the industry needs should be conducted. These researches may include other factors that affect the quality of graduates like technical teachers, facilities and equipment available, and support to students. Likewise, the digitalization in TVET has paved way for the new forms of learning for the future of work. Thus, in times of crisis like a pandemic, further research on the challenges, best practices, and breakthroughs in the curriculum cycle of TVET – planning, designing, implementing, evaluating – are recommended to be pursued.

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