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INDUSTRY-SPECIFIC KNOWLEDGE THAT VOCATIONAL TEACHERS SHOULD KNOW AND BE ABLE TO DO TO PREPARE A JOB-READY WORKFORCE

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Abstract

Industries' activity and skill demands are changing so rapidly that it is an enormous task for teachers to simply keep on top of these developments. This paper studies the industry-specific knowledge that vocational teachers should know and be able to do to be competent teachers. This industry-specific knowledge will help vocational teachers produce a skilled workforce that meets the demands of the Malaysian labor market. To identify the necessary industry-specific knowledge for Malaysian vocational teachers, a modified Delphi study has been conducted on 25 expert panelists from Malaysian vocational colleges and local universities. The experts were asked to rate the eleven-predetermined industry-specific knowledge. In addition, the panelists were asked to suggest any industry-specific knowledge that they believed Malaysian vocational teachers needed to know. Through two rounds of Delphi surveys, 13 areas of industry-specific knowledge have been identified necessary for Malaysian vocational teachers. That industry-specific knowledge will enrich vocational college instructors' teaching competencies, especially regarding planning and preparing their teaching activities so vocational students will have the up-to-date knowledge and skills required by potential employers.

Keywords: Industry-specific knowledge, Vocational education and training, Teaching competencies, Malaysian Vocational College, Job-ready students.

1. Introduction

The workforce in Malaysia has been described as having an inadequate level of education and skills for the jobs for which they were hired [1, 2]. The low-skilled workforce overload has affected Malaysian business operations and growth [1]. As a result, businesses and industries in Malaysia are having difficulties to recruit and retain skilled workers at the technical, supervisory and managerial level [3]. About 40% of Malaysian firms have indicated vacancies for skilled production worker positions [2]. To overcome the shortage of high-skilled workers in Malaysia, the government has introduced a vocational college system to replace the previous vocational school system [4]. The transformation aims to improve public perceptions of technical and vocational education and to increase student enrollment. Furthermore, the transformation is expected to produce students who are technically competent at graduation and have the requisite skills and knowledge needed by industries in Malaysia [4].

The goal of Malaysian vocational colleges is to produce job-ready students equipped with knowledge and skills needed by industries [1, 4]. Given the rapid pace of technological advancement in various industries, vocational teachers are expected to be continuously up to date with the development of the industry in which they specialize. As studies [5, 6] have emphasize, industries are changing so rapidly that vocational teachers are required to consistently update their industry-specific knowledge regarding those developments. In this article, the term "industry-specific knowledge" refers to teachers' awareness of and familiarity with current developments, activities, and needs in industries that are potential workplaces for their students [7]. Competency in industry-specific knowledge is important for vocational teachers because they are expected to assist learners in developing industrial knowledge and skills to meet the needs of employers [6].

However, because the vocational college system in Malaysia is still relatively new, there is limited information and understanding about the industry-specific knowledge needed by Malaysian vocational teachers. Hence this study was conducted to identify industry-specific knowledge that Malaysian vocational teachers should know and be able to do to develop job-ready students equipped with current knowledge and skills needed by industries. In this article, Malaysian vocational teachers refer to teachers who teach vocational subjects in Malaysian vocational colleges.

2. Industry-Specific Knowledge for Vocational Teachers

Industry-specific knowledge has been widely discussed in the technical and vocational education field as an important competency for vocational teachers [5, 7, 8]. This competency is important because vocational students are expected be job-ready upon their graduation, so their teachers are responsible for training them with skills and knowledge needed by industries [9]. For example, Cort et al. [8] foresaw that in a modern vocational education system, vocational teachers no longer just teach technical skills to their students; their profession involves multi-dimensional duties that require them to understand the interlinkage between education, the labor market, and society to develop job-ready graduates (Fig. 1).

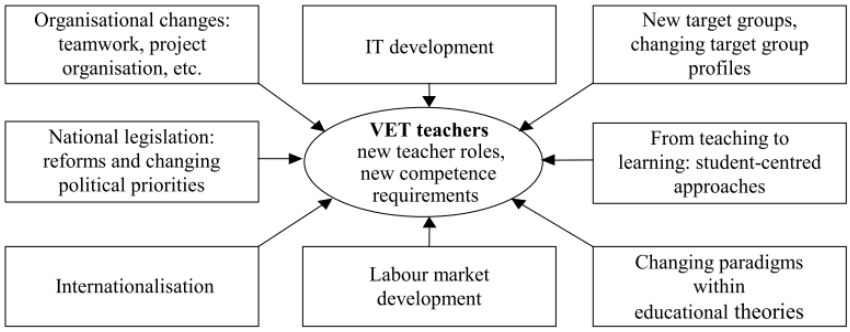

Fig. 1. Working context of vocational education teachers [8].

Table 1. Industry-specific knowledge that vocational teachers need to know and be able to do to prepare job-ready students.

Competencies	**Journal Article**			**Vocational Teacher Standard**		
Documents	[10]	[8]	[11]	[7]	[9]	[12]
Identify available occupation in related industry	⟋	⟋	⟋	⟋	⟋	
Identify job scope in related industry	⟋	⟋	⟋	⟋		
Stay informed with current job market trends	⟋	⟋	⟋	⟋	⟋	
Identify workplace safety and health				⟋		
Identify technology used in the workplace	⟋	⟋	⟋	⟋	⟋	
Stay informed of technological advances and workplace changes	⟋	⟋	⟋	⟋	⟋	⟋
Identify mathematical and scientific concepts fundamental to the industry	⟋			⟋		
Design teaching strategies that increase students' understanding of specific tasks at the industry level		⟋	⟋	⟋		⟋
Communicate with industrial experts	⟋	⟋	⟋	⟋	⟋	
Arrange internships for students	⟋	⟋	⟋		⟋	
Engage in industrial activities related to teaching field	⟋	⟋	⟋	⟋		

Among the eight modern vocational instructor roles and competencies shown in Fig. 1, four directly relate to industry-specific knowledge: (a) labor market development, (b) IT development, (c) internationalization, and (d) organizational changes. According to Cort et al. [8], because of the advancement of IT into every field of business, vocational teachers have to integrate IT elements into their teaching activities to develop students with essential IT skills needed by the labor market. They also must become familiar with globalization, which affects many industries in terms of language, culture, and technology. For example, a factory in Malaysia can be a branch of a European company and use English as a common language in its operation. So, if vocational teachers have already exposed their students to English technical terms and encouraged them to speak and write in English, they can provide students with a huge advantage to secure a position in that company.

The extensive literature review conducted on Cort et al. [8] along with five other literatures (see Table 1) were able to identify 11 competencies related to industry-specific knowledge needed by vocational teachers to produce job-ready students. All of these elements have been identified as the predetermined industry-specific knowledge that Malaysian vocational teachers should know and teach to fulfill the vocational college goal of producing job-ready students upon their graduation.

3. Methodology

This study used a modified Delphi technique. In this study, a structured questionnaire based on the extensive review of literature was used in the first round of survey [13]. Then, several rounds of additional surveys were conducted to determine the industry-specific knowledge that Malaysian vocational teacher needs to be proficient in teaching. The samples involved in this study were experts including vocational college teachers, and university lecturers, who we identified according to the criterion of having more than five years each of experience teaching vocational subjects and conducting student teaching observation. Having a panel of experts in a Delphi study is important because input gathered from their knowledge and experience is used to maintain the validity of the study. Our experts included 19 teachers from Pioneer Malaysian vocational colleges and six lecturers from Malaysian technical and vocational teachers' education programs.

Data collection began with the study invitation. The identified experts were approached in two ways: via email or face-to-face meetings. In the initial communication, the researcher explained to each expert the study's purpose and design, which included several rounds of surveys. Experts who agreed to participate in the study were given the choice to either participate online or through a paper-based survey. If the experts chose to participate online, they were given a link to a website (Qualtrics.com). If the experts chose to participate via a paper-based survey, they were provided with a return envelope.

The first-round survey consisted of two parts: closed-ended questions that required experts to rate their opinions on the predetermined competencies gathered from the literature review and an open-ended question that asked experts to suggest new industry-specific knowledge that Malaysian vocational teachers needed to be proficient in teaching. In the second-round survey, the experts were

required to revise the conflict competencies (competencies that received less than 90% positive rating) and to rate new suggested competencies identified from the first-round survey. Likert-type scale with five options (ranging from very necessary to very unnecessary) was used in closed-ended questions in both rounds of the surveys. The descriptive statistics was used to analysis the study's quantitative data. The researcher accumulates the positive ratings (i.e., ratings of necessary and very necessary) and the negative ratings (i.e., ratings of unnecessary and very unnecessary) received for each competency. Consensus was determined when the competency received more than a 90% positive or negative rating. The survey will be conducted for several rounds until all of the consensus of predetermined competencies and additional competencies suggested by the experts has been determined. In the open-ended sections of the survey, the thematic analysis technique was used to analyze qualitative data collected.

4. Findings

A result from first round survey shows that all 11 predetermined competencies received more than 90% positive ratings (very necessary or necessary for Malaysian vocational teachers). Hence, all of them were accepted as industry-specific knowledge that Malaysian vocational teachers should know and be able to teach. Of the 11 competencies, five received 100% consensus from all 25 experts: (a) identifying occupation related to the industry, (b) identifying workplace safety and health issues, (c) identifying job scope in the relevant industry, (d) designing teaching strategies that increase students' understanding of the application of specific tasks at the industry level, and (e) communicating with industry experts.

In the open-ended section of the first-round survey, the panelists were asked, "What are other industry-specific knowledge necessary for vocational teachers to produce skilled workers in Malaysia?" Based on the analysis, the panelists suggested two new competencies: (a) adapt the latest technology into the curriculum (e.g., teach students about smartphone systems and reparation, which is a necessary skill in many telecommunication business centers) and (b) identify information regarding the National Occupational Skills Standard (NOSS), which is a list of industry-mandated skills and performance standards for specific occupations developed by the Department of Skills Development.

The researcher omitted the competencies that received more than a 90% positive rating in the first-round survey from the second-round survey. Therefore, only the two new competencies identified in the first-round survey were included in the second-round survey. The necessity of these new competencies in the survey were also explained. The results of the second-round survey showed that the two new competencies received 100% positive consensus from all 25 panelists. This Delphi study only involved two rounds of survey because the consensus of all the competencies has been determined after the second-round survey has been analyzed.

Based on the analysis, the experts identified 13 competencies as industry-specific knowledge in which Malaysian vocational college teachers need to be proficient. The competencies are listed in Table 2.

Table 2. The approval percentage for each competency.

No. of Survey	Competencies	Percentage of Rating (%)	
		Positive Rating	**Negative Rating**
First-Round Survey	Identify occupations related to the industry (e.g., automotive = mechanic)	100	0
	Identify job scope in the relevant industry (e.g., the automotive industry involves repairing automobile engines)	100	0
	Identify current job market trends	96	4
	Identify workplace safety and health issues	100	
	Identify technology used in the workplace	96	4
	Stay informed with technological advancements and changes in the workplace	96	4
	Identify mathematical and scientific concepts fundamental to the industry	96	4
	Design teaching strategies that increase students' understanding of specific tasks at the industry level	100	0
	Communicate with industry experts	100	0
	Engage in industrial activities related to teaching field	96	4
	Arrange internships	96	4
Second Round Survey	Adapt the latest technology into the curriculum	100	0
	Identify information regarding NOSS developed by the Department of Skills Development	100	0

5. Discussion

Industry-specific knowledge is important for teachers to possess to effectively plan and prepare their teaching activities [14]. Because the vocational education system trains the workforce needed by industries [15], vocational teachers should have a rich understanding of the nature of industrial activities and other major concepts related to the industry for which they prepare students to enter [7]. This information, along with pedagogical knowledge, helps teachers to plan their lessons, develop curricula, and facilitate students' success within the industry [7].

The study's results show that all 11 predetermined competencies and the additional two competencies suggested by the panelists (shown in Table 2) are

competencies that vocational teachers should know and be able to do to be proficient in vocational education. According to NBPTS [7], vocational teachers should be able to personally identify current and emerging technologies being applied in workplaces. They should share this information with their students to help them understand current practices and future trends in the workplace and prepare them for the changing demands of the marketplace's needs [7]. Additionally, by integrating this industry-specific knowledge into their teaching activities, vocational teachers can equip their students with workplace readiness and prepare them to face the demands of a globalized economy and diverse working communities [7]. In addition, teachers with updated knowledge of industries and current job markets trends can channel their students' interests and qualifications into the right job opportunities.

The panelists in the study agree that vocational teachers should be able to identify information regarding NOSS because NOSS is a list of industry-mandated skills and performance standards for specific occupations [16]. Hence, NOSS will be the benchmark of the knowledge and skills that vocational college teachers are expected to teach their students. In addition, vocational colleges decided that their students should be competent in level four of the standard, meaning that vocational teachers must possess knowledge and skills beyond level four of NOSS.

6. Final Thoughts and Implications for Practice

In conclusion, for vocational teachers to be current in their content knowledge and pedagogical knowledge, they need to be competent in industry-specific knowledge, which includes knowledge of occupations, job scope, the job market, technologies, and changes and developments in the industry. This competency is important to ensuring the effectiveness of their teaching and helping vocational college students make career decisions.

This study identified 13 competencies related to industry-specific knowledge that vocational teachers in Malaysia should know to be proficient in their teaching, which are listed in Table 2. However, becoming competent in industry-specific knowledge is not an easy task because vocational teachers are burdened with many responsibilities and duties, including class management, administrative tasks, and involvement in extracurricular activities. Therefore, policy makers, including the Malaysian Division of Technical and Vocational Education (BPTV) and vocational college administrators, should have a round table discussion with vocational college teachers to overcome workload issues, which will allow these teachers to allocate their time to becoming competent in industry-specific knowledge.

Networking between vocational colleges and industries is another effort that can improve vocational college teachers' industry-specific knowledge. Networking with industries can provide teachers with information regarding technology development, labor market trends, and the characteristics of the workforce needed by the industries. Among the strategies to start networking is participation in industrial attachment, which will provide vocational teachers with opportunities to meet and communicate with industrial experts as well as allow teachers to improve their skills in the areas they are teaching through familiarity with industrial activities and environments [11]. In addition, during industrial attachment, vocational

teachers can approach industry experts to be involved actively in vocational college system as example by appoint them as curricula advisory committees.

Finally, vocational college administrators and BPTV should play an important role in assuring the success of industrial networking and teachers' industrial attachment efforts. BPTV should encourage industrial involvement in the educational system by persuading the government to give incentives such as tax redemptions to businesses that become actively involved with vocational education activities. BPTV and vocational college administrators also need to support and encourage teachers' involvement in industrial attachment, as example by paying teachers to engage in industrial attachment for a period of time.

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