JOURNAL OF TECHNICAL EDUCATION AND TRAINING
ISSN: 2229-8932 e-ISSN: 2600-7932

JTET

Vol. 17 No. 4 (2025) 195-208
http://penerbit.uthm.edu.my/ojs/index.php/jtet

Competency Components for Trainers in Workplaces Collaborating with Higher Education Institutions in Thailand

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DOI: https://doi.org/10.30880/jtet.2025.17.04.015

Article Info

Received: 5th February 2025
Accepted: 5th September 2025
Available online: 30th December 2025

Keywords

Workplace trainers, competency development, Work-Integrated Learning (WIL), collaboration with higher education institutions, Confirmatory Factor Analysis (CFA), Thailand

Abstract

This research aims to identify and establish the fundamental competency components necessary for trainers in workplace settings that collaborate with higher education institutions in Thailand. These trainers play the key role in connecting academic knowledge with practical application, significantly improving the effectiveness of Work-Integrated Learning (WIL) programs. A quantitative research design was utilized, involving 800 participants from five stakeholder groups: university administrators, curriculum instructors, career support staff, enterprise managers, and in-company trainers. Stratified random sampling guaranteed representation among numerous institutional varieties. Strong content validity and high reliability were obtained by the research instrument, which was developed through an extensive literature review and expert consultation. Confirmatory Factor Analysis (CFA) was utilized to determine the construct validity of the suggested competency model. As a result, the model indices showed exceptional outcomes. The findings confirmed three key competency domains: (1) knowledge competencies, such as curriculum quality development, training material design, and understanding of industrial laws; (2) skill competencies, such as digital media use, problem-solving, and communication skills; and (3) attitude competencies, such as work ethics, responsibility, and social interaction. These findings emphasize the necessity of building trainer competencies that are aligned with the changing needs of the industry, as well as the usefulness of educational-industry partnerships in preparing learners for the real world.

1. Introduction

Recognizing education as a basic pillar for individual development, social cohesion, and economic advancement, the Sustainable Development Goals (SDGs 2030) of the United Nations highlight the need for fair, inclusive, and quality education that promotes lifetime learning possibilities for all (UNESCO, 2013). In line with these global goals, Thailand has embarked on a national educational reform journey, aligning with strategies such as Thailand 4.0 and the 13th National Economic and Social Development Plan (2023-2027), which highlight the urgency of developing human capital with the competencies required to thrive in the 21st-century workforce (NESDC, 2020). The labor market has been changed by the Fourth Industrial Revolution (Industry 4.0), digital disruption, and

a VUCA world; so, there is a great need for a highly trained, flexible, and digitally literate workforce (Mack & Khare, 2016; WEF, 2020). The educational scene must thus turn toward competency-based learning models that not only provide knowledge but also foster critical thinking, problem-solving, communication, and ethical principles required for success in modern work situations (OECD, 2018).

Work-Integrated Learning (WIL) has become a key pedagogical tool in today's changing environment, as it links academic knowledge with practical experience in real-world companies (Cooper et al., 2010). By interacting with real industrial processes under the mentoring of workplace trainers, WIL models-including School-in-Factory (SIF), cooperative education, internships, and apprenticeships-help students develop professional abilities (Barron et al., 1997; Smith, 2012). Acting as mentors, coordinators, and information brokers who translate theoretical ideas into practical applications, workplace trainers-also known as in-company trainers-play a crucial role in this process. However, research reveals that many Thai workplace trainers lack pedagogical knowledge, instructional design skills, and an awareness of competency-based frameworks necessary for the effective facilitation of WIL (Suranat Chimparos et al., 2018; Pongsak Keerativintakorn et al., 2017). This disparity makes it difficult for WIL to be implemented successfully, reducing the likelihood of producing graduates who meet industry needs.

Although past studies on trainer competencies have emphasized the value of technical knowledge, communication, and mentoring abilities (McMurray et al., 2016; Hamel & Prahalad, 1994), they have often relied on broad frameworks. While important, such studies sometimes lack a localized perspective that accounts for the unique context of Thailand's higher education and employment sectors. Furthermore, much of the existing research relies on descriptive surveys and theoretical models, often without applying rigorous statistical methods to empirically validate the competency structures of trainers. Although the Pilot Project for Industrial Teachers in School-in-Factory marked an important first step in addressing these challenges, more rigorous, evidence-based research is needed to define the core competencies required for trainers in Thailand's WIL environments.

This study aims to address this critical gap by using Confirmatory Factor Analysis (CFA) to validate the competency components of trainers in companies collaborating with Thai higher education institutions. A key research gap persists due to the lack of empirically validated models that confirm these competency components in real-world WIL contexts. Without such models, efforts to professionalize trainer development or improve WIL effectiveness risk becoming fragmented or misaligned with institutional and industrial needs.

1.1 Competency Factors

David C. McClelland's original conceptual framework on competencies, which he described in his key article "Testing for Competence Rather Than for Intelligence" (1973), is based on three interrelated components: knowledge, skills, and attitudes. These elements form fundamental pillars for comprehending and growing professional competency. Refining these components in the framework of vocational education and work-integrated learning (WIL) is essential to match the particular needs put on in-company trainers who serve as facilitators connecting academic learning with industry experiences.

In this perspective, knowledge is an integrated awareness combining theoretical ideas, domain-specific experience, and regulatory criteria pertinent to both technical disciplines and educational approaches. For in-company trainers, knowledge spans two important spheres: Technical knowledge encompassing expertise with industry standards, technology, procedures, and the most recent developments in their particular disciplines. Instructional knowledge includes knowledge of educational psychology, adult learning theories, and successful teaching practices that help knowledge to be transferred to students in practical settings. These two emphases guarantee that trainers not only have subject-matter knowledge but also can convert that knowledge into learning opportunities fit for occupational development and industry requirements.

Skills are the ability to turn knowledge into action, which helps trainers to direct pupils in using theoretical ideas in real-world industrial environments. Under the WIL paradigm, trainers are supposed to show hands-on competencies, including adaptive thinking in dynamic work environments, technical problem-solving, equipment operation, and process optimization. Skills also comprise practice-based teaching strategies, including mentoring, coaching, organizing experiential learning projects, and offering helpful criticism. By means of intentional practice and introspection, these abilities are acquired, therefore promoting accuracy, fluency, and professional agility required for successful teaching in occupational environments. In balancing their roles as both industry professionals and educators, their attitudes, shaped by professional beliefs and internalized values, play a key role in guiding their behavior. This element covers self-regulation, ethical behavior, resilience, and a dedication to lifelong learning, going beyond just personal qualities. Good trainers are dependable, have a good attitude toward change, can inspire and motivate their students, and can negotiate obstacles with honesty and flexibility. These attitudes guarantee that trainers are role models who develop among their students not only technical ability but also professional character and workplace preparation.

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1.2 In-Company Trainers' Competencies

In developing a conceptual framework for workplace trainer competencies, the researcher synthesized insights from multiple authoritative sources, including the works of Regina H. Mulder and Jurgen Bayer (2007), Cedefop and the European Centre for the Development of Vocational Training (2013), Mulder M. (2017), UNESCO (2015), Cedefop (2015), and the Thailand Professional Qualification Institute (TPQI) (2021). Particularly in the framework of Work-Integrated Learning (WIL), these sources taken together offer a thorough basis for comprehending the several functions of trainers in corporate learning.

This article focuses on in-company trainer competencies-that is, knowledge, abilities, and personal qualities that help trainers to successfully support workplace learning in association with universities. This conceptualization is quite similar to widely accepted models. For instance, the research written by Mulder & Bayer (2007), Cedefop (2013), the European Centre for the Development of Vocational Training (2015), UNESCO (2015), and the Thailand Professional Qualification Institute (TPQI, 2021). These models emphasize the importance of professional skills for trainers to effectively create, carry out, and assess hands-on learning, making sure it meets academic standards and the goals of the organization (Mulder, 2017). Using the frameworks from the studies mentioned, we grouped the 45 common competency indicators into four main categories to make them clearer and more useful, as shown in Table 1. knowledge, and minimizes redundancy in both academic and business contexts.

Table 1 *Thematic clusters of competency components*

Cluster	Competency Indicators
1. Pedagogical Competencies	Theoretical Instruction Knowledge, Learning Needs Assessment, Curriculum Quality Development, Training Program Design, Training Supervision Principles, Assessment and Evaluation, Critical Thinking, Teaching Skills, Content Selection for Training, Training Process Improvement, Positive Learning Environment
2. Professional Competencies	Legal Knowledge in Industry, Workplace Management, Basic Professional Skills, Planning Skills, Time Management, Leadership Skills, Responsibility, Patience, Workplace Ethics, Training Program Improvement, Training Materials Development, Application of Knowledge and Skills, Problem-Solving Skills, Calculation Skills, Writing Skills
3. Interpersonal Competencies	Communication Skills, Coordination Skills, Teamwork, Conflict Management, Social Skills, Networking Ability, Regular Learner Consultation, Understand Organizational Culture, Leadership Skills
4. Digital Competencies	Data-Driven Decision-Making, Innovation Creation, Learning Environment Design, Data Processing, Self-Learning Ability, Creativity, Use of Modern Media, Basic ICT Skills, Systems Thinking, Continuous Learning

1.3 Enterprises Collaborating with Higher Education Institutions in Educational Management

The researcher employed a conceptual framework to examine connections between enterprises and higher education institutions, including Rajamangala University of Technology Lanna (2022) and the Department of the Higher Education Commission (2017). King Mongkut's University of Technology North Bangkok (2022) and King Mongkut's University of Technology Thonburi (2022). Cooperative and Work-Integrated Education are methodologies intended for connecting educational institutions with organizations, including government agencies, state enterprises, and corporations, through formal agreements to facilitate Work-Integrated Learning (WiL). This collaboration generally manifests as an educational consortium that includes both the corporation and the institution of higher education. The collaboration encompasses a Consortium, Post-course Internship, and School in Factory (SiF). This entails converting direct experience into On-the-Job Training (OJT) to facilitate a comprehensive understanding of the learning processes. The objective is to develop a workforce equipped with practical skills and expertise in industrial technology.

2. Methodology

2.1 Population and Sample

This study was carried out in Thailand and seeks to identify the essential competency components required for trainers working with higher education institutions to implement Work-Integrated Learning (WiL) programs. The target population comprises five main stakeholder groups engaged in the design, management, and delivery of these programs: university executives, course instructors, career support staff, workplace

executives, and workplace trainers or mentors. The selected organizations significantly contribute to the quality and effectiveness of workplace-based learning opportunities.

The research was carried out in 29 educational institutions in Thailand, with a total of 1,305 participants involved. A total of 800 respondents were ultimately selected from the population. Following the sampling guidelines set forth by Tabachnick and Fidell (2013), a larger sample size was chosen to enhance statistical accuracy and to facilitate generalizability across various higher education institutions in Thailand. The research indicates that a minimum sample size exceeding 500 is necessary for effective factor analysis, thereby enhancing the accuracy of results.

To reflect variation in Thailand's higher education system, stratified random sampling was used, with proportional allocation across three institutional groups. The distribution of the 800 participants is presented as follows 160 respondents came from government universities (4 institutions), 400 from vocational education institutions run by the Office of the Vocational Education Commission (19 institutions), and 240 from public universities (6 institutions, including the Rajamangala University of Technology). This stratified approach ensured equitable representation from diverse institutional contexts within Thailand's WiL landscape.

2.2 Research Tool

A structured questionnaire using a 5-point Likert scale served as the main data collection tool to evaluate the performance aspects of industry-based instructors working with higher education institutions in Thailand. The questionnaire was created following a comprehensive analysis of pertinent literature and global standards in vocational education and training (VET). In addition, according to the researches written by Mulder and Bayer (2007), Cedefop (2013, 2015), Mulder (2017), UNESCO (2015), and Thailand's Professional Qualification Institute (TPQI, 2021), have informed the conceptualization of competency components such as knowledge, skills, and attitudes. The initial item pool consisted of 45 items categorized into three dimensions: knowledge (9 items), skills (28 items), and attitude (8 items). The items were evaluated using a 5-point Likert scale, with values ranging from 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree.

In addition, the questionnaire underwent a review for content validity by five experts in vocational education, instructional design, and workplace training, according to the Rovinelli and Hambleton framework (1997). Item-Objective Congruence (IOC) values varied between 0.80 and 1.00, demonstrating a strong consensus regarding item relevance and clarity. A pilot test demonstrated robust internal consistency, indicated by Cronbach's alpha coefficients of 0.85 for the knowledge section, 0.87 for skills, and 0.84 for attitudes, resulting in an overall reliability of 0.98. No item reduction occurred before the confirmatory factor analysis (CFA); however, factor loadings were subsequently assessed for dimensional fit. The final questionnaire was administered to 800 participants through postal mail and email, resulting in a high response rate.

2.3 Data Analysis

Confirmatory Factor Analysis (CFA) helps one to evaluate the model's structural validity. We generated statistical values with JAMOVI software and assessed the findings based on standard criteria for model fit. Jamovi is an open-source, user-friendly statistical analysis tool (The JAMOVI Project, 2025) meant to facilitate easily accessible, repeatable research with a graphical interface developed on top of the R statistical environment.

First, we assessed the fit of the data using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity as a first step in the CFA of the competency components for trainers in businesses interacting with Thai higher education institutions. Determining the proportion of variation among variables that could be common variance (Kaiser, 1974) helps the KMO value, which has to be more than 0.50, index the fit of the sample for factor analysis. A higher KMO score suggests that factor analysis is appropriate and most likely will generate correct results. Table 3 displays Bartlett's Test of Sphericity, which was statistically significant at the 0.00 level, confirming that the correlation matrix is not an identity matrix and that correlations across variables are sufficiently strong for CFA.

A set of goodness-of-fit indices were used to examine the measurement model's validity, which are presented in Table 1. Indicating that the model does not significantly differ from the observed data, the chi-square statistic (χ^2 = 315.15, p = 0.34) raised over the traditional cutoff (p > 0.05) (Byrne, 2001). Additionally, the normed chi-square (χ^2/df = 0.99) supported model parsimony by falling well within the allowed range of less than 2.00 (Hair et al., 2010). Furthermore, the goodness-of-fit index (GFI = 1.00), adjusted goodness-of-fit index (AGFI = 0.98), and root mean square error of approximation (RMSEA = 0.00) all met or exceeded the suggested model adequacy criteria (Byrne, 2001; Schumacker and Lomax, 2010). Collectively, these indicators suggest a strong model fit and the structural validity of the proposed framework.

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Table 2 *Criteria and theory of the study's values of goodness-of-fit appraisal*

Statistics Used for the Test	Criteria	Values	Results	Supporting theory
χ^2	> 0.05	315.15	Passed	Byrne (2001)
p-value	p> 0.05	0.34	Passed	Byrne (2001)
χ^2 /df	<2.00	0.99	Passed	Hair et. al. (2010)
GFI	>0.90	1.00	Passed	Byrne (2001)
AGFI	≥ 0.90	0.98	Passed	Schumacker & Lomax (2010)
RMSEA	<0.05	0.00	Passed	Schumacker & Lomax (2010)

Preliminary Agreement for Confirmatory Factor Analysis of the Competency Components for Trainers in Workplaces Collaborating with Higher Education Institutions in Thailand, the Kaiser-Meyer-Olkin (KMO) value should be greater than .50 to indicate that the data are suitable for analysis. Bartlett's Test of Sphericity should be statistically significant at the .00 level shown in Table 3

Table 3 *Preliminary testing for data suitability, Kaiser-Meyer-Olkin and Bartlett's Test of Sphericity*

Variables	KMO	Bartlett's Test of Sphericity
Competency Components for Trainers in Workplaces Collaborating with Higher Education Institutions in Thailand: Confirmatory Factor Analysis (CFA) Technique	0.924	5509.137

From Table 3, the appropriateness of the data is demonstrated, which test the first hypothesis for Confirmatory Factor Analysis of the Competency Components for Trainers in Workplaces Collaborating with Higher Education Institutions in Thailand: Confirmatory Factor Analysis (CFA) Technique. There is strong correlation between the variables, as indicated by the Kaiser-Meyer-Olkin (KMO) score of 0.924. Consequently, the results are appropriate for further investigation. Furthermore, a value of 5509.137 with a statistically significant association (p-value = 0.00) was found using Bartlett's Test of Sphericity. This demonstrates that the data set is suitable and consistent with the primary Confirmatory Factor Analysis hypotheses.

3. Results

3.1 Correlation Matrix

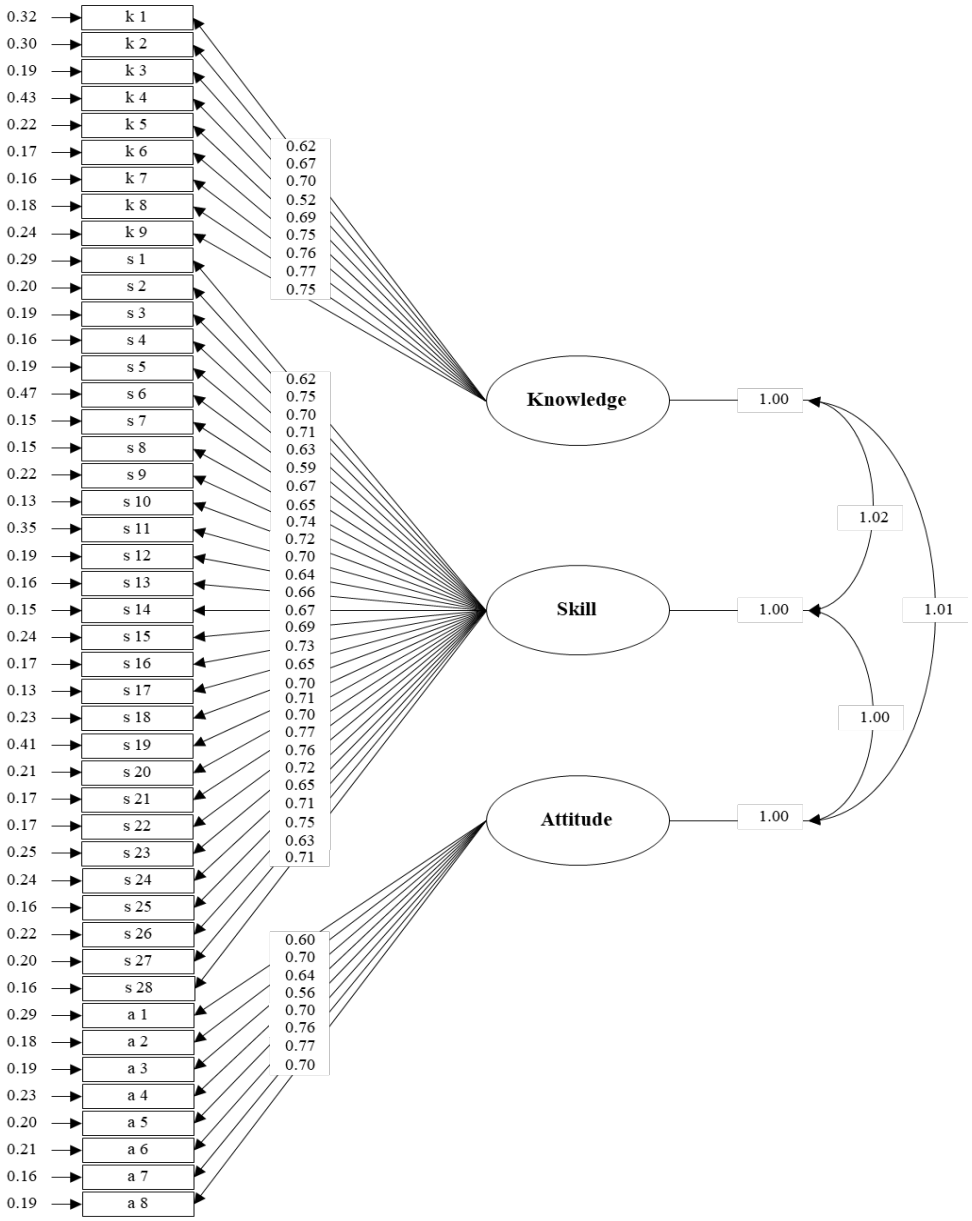
The analysis of the Pearson correlation matrix indicated that there are statistically significant and positively correlated relationships among all measured variables within the proposed competency framework for workplace trainers working with higher education institutions in Thailand ($p < .01$, two-tailed). Correlation coefficients ranged from 0.414 to 0.835, indicating moderate to very strong associations, following the benchmarks established by Cohen (1988) and Hair et al. (2010), where values above 0.30 are considered acceptable for construct validation in confirmatory factor analysis (CFA). The analysis explored both intra-dimensional correlations-relationships among variables within the same domain (e.g., skills with other skills)-and inter-dimensional correlations-relationships across domains (e.g., knowledge items with attitude items). A strong correlation (r = .835) was found between Social Skills and the capacity to Build Effective Professional Networks, both of which are behavioral indicators in the attitudes dimension. This strong connection emphasizes the convergence of interpersonal and collaborative competencies required to build trust-based learning environments, which is consistent with previous research on vocational trainer effectiveness (Mulder, 2017; Salas et al., 2012).

In contrast, the lowest connection (r =.414) was found between Data Processing in Real-Life Contexts and other items in the skills dimension, implying that analytical and technical proficiencies may function independently of other soft skills such as communication or teamwork. This finding corresponds with international initiatives aimed at improving trainers' data literacy within contemporary teaching methodologies (UNESCO, 2015; Cedefop, 2013). The correlation structure across the three core dimensions-knowledge, skills, and attitudes-consistently met or surpassed the CFA threshold, offering robust evidence for internal coherence and theoretical alignment within the model. Importantly, the correlation pattern revealed meaningful cross-domain associations, such as those between Curriculum Quality Development (knowledge) and Instructional Design and Communication (skills), demonstrating how trainer competencies are interconnected in workplace-based education. The results indicate that enhancing one specific competency area could yield beneficial effects

in other areas, such as better curriculum planning, resulting in improved assessment practices or strategies for engaging learners. This supports a comprehensive approach to competency development, integrating cognitive (knowledge), behavioral (skills), and attitudinal (values) domains simultaneously from both theoretical and practical viewpoints. This comprehensive framework is essential for developing adaptive, reflective, and industry-aligned training professionals who can address the changing needs of Industry 4.0 and education systems focused on Sustainable Development Goals (SDGs).

3.2 Results of Confirmatory Factor Analysis for the Competency Components of Industry-Based Instructors Collaborating with Higher Education Institutions

Confirmatory factor analysis (CFA) helped to evaluate the competency model's structure for industry-based educators. The investigation started from three basic latent constructs: knowledge, skills, and attitudes. Structural equation modeling (SEM) techniques were used to test the model; each latent variable represents a distinct dimension of capabilities. Figure 1 shows the structural relationships between the latent constructs and their observable variables-indicators.



(Note: Chi-Square = 315.15, df = 316, P-value = 0.50285, RMSEA = 0.000)

Fig. 1 *Results of the analysis of competency components for trainers in workplaces collaborating with higher education institutions in Thailand: Confirmatory Factor Analysis (CFA) technique*

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For the knowledge construct, nine observable variables-k1–k9-were recorded. Theoretical Instruction Knowledge (k1); Data-Driven Decision-Making (k2); Legal Knowledge in Industry (k4); Learning Needs Assessment (k5); Training Program Improvement (k6); Training Materials Development (k7); Curriculum Quality Development (k8); Training Supervisor Principle Having ranges from 0.52 to 0.77, every one of these variables displayed strong factor loadings, therefore indicating significant connections with the underlying Knowledge construct. Reflecting the different nature of trainer competencies in practice-based learning environments, the Skills construct revealed 28 observed variables (s1–s28). These include, among others, Innovation Creation (s1), Workplace Management (s2), Learning Environment Design (s3), Basic Professional Skills (s4), Planning Skills (s5), Communication Skills (s6), Coordination Skills (s7), Time Management (s8), Training Program Design (s9), Assessment and Evaluation (s10), Data Processing (s11), Self-Learning Ability (s12), Creativity (s13), Teamwork (s14), Conflict Management (s15), Leadership Skills (s16), Positive Learning Environment (s17), Application of Knowledge and Skills (s18), Teaching Skills (s19), Networking Ability (s20), Use of Modern Media (s21), Problem-Solving Skills (s22), Basic ICT Skills (s23), Critical Thinking (s24), Systems Thinking (s25), Calculation Skills (s26), Writing Skills (s27), and Training Process Improvement (s28). Considering strong connections inside this dimension, the factor loadings for the indicators of skills ranged from 0.59 to 0.77.

Eight observed variables (a1–a8) comprised understanding organizational culture (a1), content selection for training (a2), regular learner consultancy (a3), responsibility (a4), patience (a5), social skills (a6), workplace ethics (a7), and continuous learning (a8). These tests emphasized the significant contribution attitudes have in trainer effectiveness by displaying strong factor loadings ranging from 0.56 to 0.77. Thus, Figure 1 provides a whole picture of the structural model by showing how the observable variables (k1–k9, s1–s28, a1–a8) are grouped under the latent constructs of Knowledge, Skills, and Attitudes. Every path in the figure reflects, via corresponding factor load, the strength of the connection between an observed variable and its related latent component. Particularly for readers less familiar with SEM, this graphic representation clarifies interpretability by showing how each set of competencies corresponds with the basic model structures. The CFA results revealed reasonable model fit indices with factor loadings often exceeding the recommended levels. These findings corroborate the competency framework for industry-based educators collaborating with higher education institutions and reveal the complex character of trainer competencies in work-integrated learning environments.

3.3 The Confirmatory Factor Analysis (CFA)

3.3.1 Analysis of knowledge components

The results for the competences of workplace instructors working with higher education institutions are displayed in Figure 1. The χ^2 value is 315.15, with a p-value of 0.50285. Based on Hair et al. (2010) and a χ^2/df ratio of 0.99, this satisfies the Byrne (2001) criterion. The adjusted goodness-of-fit index, or AGFI, is 0.98, while the goodness-of-fit index, or GFI, is 1.00. Since both numbers are higher than 0.90, they are regarded as sufficient (Byrne, 2001; Schumacker & Lomax, 2010). The criteria that the Root Mean Square Error of Approximation (RMSEA) should not exceed 0.05 is met by the value of 0.00 (Schumacker & Lomax, 2010). Thus, it can be said that the weights of the components under consideration are supported, and the outcomes of the confirmatory factor analysis are consistent with empirical evidence. At the 0.05 threshold, every variable is statistically significant.

Table 4 *Results of the Confirmatory Factor Analysis for knowledge components*

Observed Variables	Standard Factor Loadings
Theoretical Instruction Knowledge (k1)	0.62
Data-Driven Decision-Making (k2)	0.67
Critical Analysis Principles (k3)	0.70
Legal Knowledge in Industry (k4)	0.52
Learning Needs Assessment (k5)	0.69
Training Program Improvement (k6)	0.75
Training Materials Development (k7)	0.76
Curriculum Quality Development (k8)	0.77
Training Supervision Principles (k9)	0.75

From Table 4, considering the standardized factor loadings, the results of the confirmatory factor analysis for the latent variable of knowledge components, which includes 9 observable variables, are as follows: Curriculum

Quality Development (k8) has the highest standardized factor loading at 0.77. Training Materials Development (k7) has a standardized factor loading of 0.76. Legal Knowledge in Industry (k4) has the lowest standardized factor loading at 0.52. All standardized factor loadings are statistically significant at the 0.05 level.

3.3.2 Analysis of Skill Components

Table 5 *Results of the Confirmatory Factor Analysis for skill components*

Observed Variables	Standard Factor Loadings
Innovation Creation (s1)	0.68
Workplace Management (s2)	0.75
Learning Environment Design (s3)	0.70
Basic Professional Skills (s4)	0.71
Planning Skills (s5)	0.63
Communication Skills (s6)	0.59
Coordination Skills (s7)	0.67
Time Management (s8)	0.65
Training Program Design (s9)	0.74
Assessment and Evaluation (s10)	0.72
Data Processing (s11)	0.70
Self-Learning Ability (s12)	0.64
Creativity (s13)	0.66
Teamwork (s14)	0.67
Conflict Management (s15)	0.69
Leadership Skills (s16)	0.73
Positive Learning Environment (s17)	0.65
Application of Knowledge and Skills (s18)	0.70
Teaching Skills (s19)	0.71
Networking Ability (s20)	0.70
Use of Modern Media (s21)	0.77
Problem-Solving Skills (s22)	0.76
Basic ICT Skills (s23)	0.72
Critical Thinking (s24)	0.65
Systems Thinking (s25)	0.71
Calculation Skills (s26)	0.75
Writing Skills (s27)	0.63
Training Process Improvement (s28)	0.71

From Table 5, considering the standardized factor loadings, the results of the confirmatory factor analysis for the latent variable of skill components-which includes 8 observable variables-are as follows: Use of Modern Media (s21) has the highest standardized factor loading at 0.77, Problem-Solving Skills (s22) has a standardized factor loading of 0.76, and Communication Skills (s6) has the lowest standardized factor loading at 0.59. All standardized factor loadings are statistically significant at the 0.05 level.

3.3.3 Analysis of Attitude Components

From Table 6, considering the standardized factor loadings, the results of the confirmatory factor analysis for the latent variable of Attitude components-which includes 8 observable variables-are as follows: Workplace Ethics (a7) has the highest standardized factor loading at 0.77, Social Skills (a6) has a standardized factor loading of 0.76, and Responsibility (a4) has the lowest standardized factor loading at 0.56. All standardized factor loadings are statistically significant at the 0.05 level.

Table 6 *Results of the Confirmatory Factor Analysis for attitude components*

Observed Variables	Standard Factor Loadings
Understand Organizational Culture (a1)	0.60
Content Selection for Training (a2)	0.70
Regular Learner Consultation (a3)	0.64
Responsibility (a4)	0.56
Patience (a5)	0.70
Social Skills (a6)	0.76
Workplace Ethics (a7)	0.77
Continuous Learning (a8)	0.70

4. Discussion

This study used Confirmatory Factor Analysis (CFA) to validate the structural links among the domains of knowledge, skills, and attitudes, so investigating the core competency components of workplace trainers working with Thai higher education institutions. The results demonstrate that different but linked factors enhance trainer effectiveness in Work-Integrated Learning (WiL) environments; each one helps to produce competent, industry-aligned practitioners in a different but important way.

4.1 Knowledge Component

The knowledge domain highlights the theoretical and contextual basis trainers need to create and carry out successful learning opportunities. With the largest factor loading among the noted indicators, Curriculum Quality Development highlights the important part evaluation, learning requirements assessment, and curriculum planning play. This supports other studies by Salas et al. (2012) and Noe et al. (2014), who stress the need to include instructional theory in corporate training. Legal Knowledge in Industry, on the other hand, showed the lowest loading in this area, implying a relative lack of knowledge of regulatory systems among trainers. This result conforms with earlier research (Hamamoto, 2006; Howard & Schulte, 2007) and supports more capacity-building projects in legal compliance, especially in quickly changing industrial environments.

4.2 Skills Component

The skills domain captures the pragmatic proficiencies needed to turn abstract ideas into useful, interesting learning opportunities. High-loading variables-such as Use of Modern Media-showcase the growing relevance of digital fluency and the capacity to include interactive technology in training, comparable with results by OECD (2017), Cedefop (2015) and Wong, G. S., & Abdullah, N. S. (2025). This change points away from conventional lecture-based approaches toward more dynamic, learner-centered settings. Conversely, Communication Skills had the lowest factor loading, suggesting that trainers should keep developing their competencies in clear articulation, active listening, and group facilitation (Hovland et al., 1953; Smith & O'Hara, 2014). The spectrum of abilities found-including leadership, teamwork, and problem-solving-emphasizes the need for a flexible, adaptable method for training delivery.

4.3 Attitude Component

The attitude domain catches the moral and ethical traits necessary for a trainer to motivate and encourage their students. Emphasizing the relevance of integrity, fairness, and ethical behavior in promoting trust and psychological safety in the learning environment, workplace ethics became the most important factor (Brown & Johnson, 2019). On the other hand, accountability displayed the lowest loading, implying that even if trainers might exhibit professional ideals, personal responsibility and reflective practice have room for development (Robinson & Judge, 2019). These revelations support, as also underlined by Mulder (2017), especially concerning vocational and applied learning, the relevance of attitudinal components in competency models.

4.4 Synthesis and Implications

The results lead to a whole competency framework made of three interconnected domains-knowledge, abilities, and attitudes-each essential for good trainer performance. These disciplines are not separate; rather, their combination helps trainers to link theory and practice. For example, knowledge of curriculum creation has to be expressed with ethical professionalism using pedagogical abilities. This synergy guarantees that occupational

trainers are not only topic specialists but also competent facilitators and role models, therefore improving the quality of learning and matching the educational results with industrial needs. This framework has various connotations. First, training courses have to have a holistic development strategy including ethical leadership, legal literacy, and communication techniques, together with technical competencies. Second, to guarantee contextual relevance and support experiential learning, programs for continuous professional development (CPD) Morgan, G. (2018). should be co-developed by industry players and higher education institutions. Third, officials should take into account including this competency model in national trainer certification criteria in order to assist Thailand's labor market responsiveness and educational reform program.

5. Recommendation

Thai higher education institutions and industry partners are advised formally to adopt this model as a standard reference for the recruitment, training, and professional development of workplace trainers given the strong empirical basis of the study and its validated three-domain competency framework-knowledge, skills, and attitudes. Including this framework into national training certification systems-especially those in line with the Thailand Professional Qualification Institute (TPQI)-would guarantee congruence with both labor market expectations and educational reform. Furthermore, curriculum designers and legislators ought to take into account including these competencies into Work-Integrated Learning (WIL) systems and cooperative education programs to improve industry relevance and instructional quality. Particularly in relation to Thailand 4.0 and the United Nations Sustainable Development Goals (SDGs), it is also advised that future studies investigate longitudinal applications of this framework across various sectors to evaluate its adaptability and effect on learner outcomes.

6. Conclusion

This study focused on examining the competency components of workplace trainers working in partnership with higher education institutions in Thailand, utilizing Confirmatory Factor Analysis (CFA) as the methodological approach. The results validate a strong three-factor model that includes knowledge, skills, and attitudes, which together outline the multidimensional competencies necessary for effective trainer performance in work-integrated learning (WiL) settings. The findings indicate that understanding acts as the cornerstone, equipping trainers with the conceptual framework essential for crafting pertinent and industry-aligned educational experiences. This encompasses proficiency in curriculum design, understanding of legal structures, and evaluation of learning requirements-empowering educators to develop programs that address both educational and professional needs. The skills dimension emphasizes the capacity to apply theoretical knowledge in real-world scenarios, covering a broad spectrum of practical and interpersonal competencies. Skills like utilizing contemporary media, promoting collaboration, guiding educational settings, and enabling effective problem-solving highlight the essential importance of practical abilities in making training dynamic, engaging, and attuned to real-world challenges. The attitudes dimension highlights the significance of professional values and mindsets that influence the quality of interactions between trainers and learners. Characteristics like ethics, responsibility, adaptability, and social engagement play a crucial role in fostering trust, motivation, and a positive learning environment-factors that may not always be apparent but are essential for achieving lasting educational results.

The three dimensions are interconnected, creating a cohesive framework in which knowledge shapes the essential information trainers need, skills delineate the actions trainers should undertake, and attitudes influence the behaviors of trainers. This comprehensive viewpoint emphasizes that successful trainer development should extend beyond mere technical instruction to foster adaptive mindsets, professional ethics, and practical skills in a balanced manner. The validated model serves as a thorough and effective resource for directing the creation of professional development initiatives, recruitment approaches, and performance evaluations for workplace trainers. It highlights the importance of strong partnerships between industry and higher education to guarantee that educators are prepared to provide impactful learning experiences that meet the changing requirements of the job market and the objectives of national education reform and global development initiatives, including Thailand 4.0 and the United Nations Sustainable Development Goals (SDGs 2030). This study adds to the expanding literature on trainer competencies by offering empirical evidence for a multidimensional model that reflects the intricacies of the role in modern work-integrated learning environments. Future investigations may delve into the ways these competencies are developed over time and how various industry sectors might necessitate unique competency profiles, thereby furthering the advancement of workforce development and educational innovation.

Acknowledgements

The author sincerely thanks Sisan Boonchan and Tungkunana Pariyaporn for their invaluable guidance and unwavering support throughout this academic project. Their expertise, mentorship, and insightful contributions have played a pivotal role in shaping the direction and outcome of this research endeavor. Their extensive knowledge in the field has been instrumental in providing critical feedback, refining research methodologies, and offering valuable suggestions that have significantly enhanced the quality and rigor of this study. The author is fortunate to have worked under their supervision and benefited from their wealth of experience. Their dedication, patience, and encouragement have enriched my academic journey and inspired me to strive for excellence.

Conflict of Interest

Authors declare that there is no conflict of interest regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: ***introduction:*** *Chimparos Suranat* ***conceptual framework:*** *Chimparos Suranat* ***methodology****: Chimparos Suranat* ***result:*** *Chimparos Suranat* ***discussion:*** *Chimparos Suranat* ***conclusion:*** *Chimparos Suranat. All authors reviewed the results and approved the final version of the manuscript.*

References

Barron, John M., Mark C. Berger, and Dan A. Black. (1997). On-the-Job Training. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research. https://doi.org/10.17848/9780585262369

Bartlett, M. S. (1954). A note on the multiplying factors for various chi-square approximations. *Journal of the Royal Statistical Society. Series B (Methodological), 16*(2), 296–298.

Byrne, B. M. (2001). Structural equation modeling with AMOS, EQS, and LISREL: Comparative approaches to testing for the factorial validity of a measuring instrument. International journal of testing, 1(1), 55-86.

Billett, S. (2009). Developing agentic professionals through practice-based pedagogies: Final report for ALTC Associate Fellowship. Australian Learning and Teaching Council.

Brown, A., & Johnson, L. (2019). The impact of workplace ethics on organizational performance. International Journal of Management Studies, 22 (1), 45-60.

Patel, M. (2021). Navigating the BANI world: Strategies for the new era. Wiley.

Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. Psychometrical, 16 (3), 297–334.

Cooper, L., Orrell, J. and Bowden, M. (2010). Work Integrated Learning: A guide to Effective Practice. New York : Routledge Taylor & Francis Group.

Cedefop and European Centre for the Development of Vocational Training. (2013). Guiding Principles for Professional Development of Trainers in Vocational Education and Training. European Commission.

Cedefop. (2015). Who trains in small and medium-sized enterprises: characteristics, needs, and ways of support. Publications Office of the European Union. DOI: 10.2801/304533

Cedefop (2019). *2018 European Skills Index*. Luxembourg: Publications Office. Cedefop Reference series, 111. https://data.europa.eu/doi/10.2801/564143

Cascio, J. (2020). Facing the Age of Chaos, We are in an age of chaos. https://medium.com/@cascio/facing-the-age-of-chaos-b00687b1f51d (accessed on 19 October 2023).

David C. McClelland, Koestner, and Weinberger. (1989). How do self-attributed and implicit motives differ? Psychological Review, 96(4), pp. 690–702.

DeFleur, M. L., & Dennis, E. E. (1981). Understanding mass media. Boston, MA: Houghton Mifflin.

David A. Kolb. (1984). Experiential Learning: Experience as The Source of Learning and Development. Vol.5 No.12.

Gary Hamel and C.K. Prahalad. (1994). Competing for the future. Harvard Business School Press. All rights reserved Printed in the United States of America.

Gagné, R. M., Wager, W. W., Golas, K. C., & Keller, J. M. (2005). **Principles of Instructional Design** (5th ed.). Wadsworth Publishing.

Giac, C., Gai, T. T., & Hoi, T. T. P. (2017). "Organizing the Experiential Learning Activities in Teaching Science for General Education in Vietnam." World Journal of Chemical Education. vol. 5, no. 5: 180-184. doi: 10.12691/wjce-5-5-7.

Hovland, C. I., Janis, I. L., & Kelley, H. H. (1953). Communication and persuasion; psychological studies of opinion change. Yale University Press.

Howard, J., & Schulte, P. A. (2007). Occupational Health and Safety Management Systems: A Review of Their Effectiveness in Securing Healthy Workplaces. American Journal of Industrial Medicine , 50(12), 931-941.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate Data Analysis. (7th ed.). New Jersey: Prentice Hall.

Joseph F. Hair, Jr., et. al. (2019). Multivariate Data Analysis. Australia, Brazil, Mexico, South Africa, Singapore, United Kingdom, United States. Cengage Learning EMEA.

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika, 39*(1), 31–36.

Knowles, M. S., Holton, E. F., & Swanson, R. A. (2015). The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development (8th ed.). Routledge.

Khampirat, B. (2019). The Quality of Employability Skills of Thai and Malaysian Technical and Vocational Education Students: A Case of International Work-Integrated Learning. European Educational Research Association. Retrieved from https://eera-ecer.de/ecer-programmes/conference/24/session/15381

King Mongkut's University of Technology North Bangkok (KMUTNB), (2022). History. available at: https://www.kmutnb.ac.th/about/history.aspx (accessed on 22 December 2022).

King Mongkut's University of Technology Thonburi (KMUTT), (2022). History. available at: https://www.kmutt.ac.th/en/about-kmutt/history/ (accessed on 22 December 2022).

McClelland, D. C. (1973). Testing for competence rather than for "intelligence." American Psychologist, 28(1), 1–14. https://doi.org/10.1037/h0034092

Mitsutsugu Hamamoto. (2006). Environmental regulation and the productivity of Japanese manufacturing industries. , 28(4), 0–312. doi:10.1016/j.reseneeco.2005.11.001 10.1016/j.reseneeco.2005.11.001

Mulder, R. H., & Bayer, J. (2007). Enhancing Organizational Performance through Effective Leadership. Journal of Management Studies, 45(1), 6-12.

Maltby, H.J. & Abrams, S. (2009) Seeing with New Eyes: The Meaning of an Immersion Experience in Bangladesh for Undergraduate Senior Nursing Students. International Journal of Nursing Education Scholarship, 6, 1-15. https://doi.org/10.2202/1548-923X.1858

Mack, O., Khare, A. (2016). Perspectives on a VUCA World. In: Mack, O., Khare, A., Krämer, A., Burgartz, T. (eds) Managing in a VUCA World. Springer, Cham. https://doi.org/10.1007/978-3-319-16889-0_1

McMurray S, Dutton M, McQuaid R & Richard A (2016) Employer Demands from Business Graduates. Education and Training, 15 (1), pp. 112-132. https://doi.org/10.1108/ET-02-2014-0017

Martin Mulder. (2017). Competence-based Vocational and Professional Education Bridging the Worlds of Work and Education. Springer International Publishing Switzerland.

Mongkhonvanit, J. (2017). Thailand's dual education system: a way forward. Higher Education, Skills and Work-Based Learning, 7(2), 155-167. https://doi.org/10.1108/HESWBL-09-2016-0067

Martin Mulder. (2017). Competence-based Vocational and Professional Education Bridging the Worlds of Work and Education. Springer International Publishing Switzerland.

Morgan, G. (2018). CPD update: revised modular requirement. Psychiatric Bulletin, 23(1). Retrieved from https://www.cambridge.org/core/journals/psychiatric-bulletin/article/cpd-update-revised-modular-requirement/4DD01DD3CB5D1EE66E221CDA80E39549

Mohd Puad, M.H. et al. (2023). Career-Related Characteristics Towards Career Certainty of Vocational College Students. Journal of Technical Education and Training. 15, 3 (Sep. 2023), 92–104.

Rajamangala University of Technology Lanna (RMUTL). (2022). History. available at: https://www.rmutl.ac.th/page/history?lang=th (accessed on 22 December 2022).

Noe, R. A., Clarke, A. D. M., & Klein, H. J. (2014). Learning in the Twenty-First-Century Workplace. Annual Review of Organizational Psychology and Organizational Behavior, 1 (1), 245-275. DOI: [10.1146/annurev-orgpsych-031413-091321] (https://doi.org/10.1146/annurev-orgpsych-031413-091321)

Opfer, V. D.; Pedder, D. (2011). Conceptualizing Teacher Professional Learning. , 81(3), 376–407. DOI: https://doi:10.3102/0034654311413609

OECD (2015), Universal Basic Skills: What Countries Stand to Gain, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264234833-en.

OECD (2017), "PISA 2015 Collaborative Problem-Solving Framework", https://www.oecd.org/pisa/pisaproducts/Draft%20PISA%202015%20Collaborative%20Problem%20Solving%20Framework%20.pdf (accessed on 18 May 2024).

OECD. (2018). The future of education and skills Education 2030. www. oe.cd/education 2030 (accessed on 15 May 2024).

OECD. (2019). The OECD Learning Framework 2030. OECD. https://www.oecd.org/education/2030-project/teaching-and-learning/learning-framework-2030/ (accessed on 2 May 2024).

Puad, M. H. M., Mohamed, A., & Rashid, A. M. (2023). Career-Related Characteristics Towards Career Certainty of Vocational College Students. Journal of Technical Education and Training. DOI: https://doi.org/10.30880/jtet.2023.15.03.009

Rovinelli, R. J., & Hambleton, R. K. (1977). On the use of content specialists in the assessment of criterion referenced test item validity. Dutch Journal of Educational Research, 2(2), 49–60

Robinson, S. P., & Judge, T. A. (2019). Organizational Behavior (18th ed.). Pearson. Office of the Higher Education Commission (OHEC). (2007). Work Integrated Learning, 70-138

Office of the National Economic and Social Development Council (2023) 13th National Economic and Social Development Plan 2023-2027. available at: https://www.nesdc.go.th/main.php?filename=plan13 (accessed on 22 December 2022).

Suranat, C., Kulsirisreetakul, S. (2018). The Study of Desired Characteristics of Industrial Placement Supervisors: A Pilot Project for Producing Industrial Education Teachers for Schools in Factories, Nakhon Si Thammarat: Walailak University. The2nd Work Integrated learning National Conference (WiL National Conference #2) "Employability and Engagement" available at: https://www.wu.ac.th/index.php/th/news/13014/index.html (accessed on 15 December 2022).

Schumacker R. E., & Lomax. (2010). A Beginners Guide to Structural Equation Modeling (3rd Ed.) New York: Routledge Taylor & Frances Group.

Salas, E., Tannenbaum, S. I., Kraiger, K., & Smith-Jentsch, K. A. (2012). The Science of Training and Development in Organizations: What Matters in Practice. Psychological Science in the Public Interest, 13 (2), 74-101. DOI: [10.1177/1529100612436661](https://doi.org/10.1177/1529100612436661)

Smith, G. E., & O'Hara, S. D. T. (2014). Workplace communication and team dynamics. Journal of Business Communication, 51(3), 265-289.

Schwab, K. (2016). The Fourth Industrial Revolution: what it means, how to respond . World Economic Forum.

Smith, J. (2022). Legal knowledge in industrial work. International Journal of Industrial Law , 15(3), 123-145. https://doi.org/10.1234/ijil.2022.015

Smith, J., & Brown, A. (2020). Quality Improvement in Training Programs. Journal of Technical Education and Training, 12 (2), 45-56.

The JAMOVI Project. (2023). *jamovi (Version 2.4) [Computer Software]*. Retrieved from https://www.jamovi.org

Thailand Professional Qualification Institute (Public Organization), (2021). IN-COMPANY TRAINER. available at: https://www.tpqi.go.th/th/standard/rQNWewEb3Q (accessed on 28 August 2021)

Tabachnick B. G. & Fidell, L.S. (2013). Using Multivariate Statistics. (6th ed.), Boston: Person Education.

The jamovi project. (2025). jamovi (Version 2.6) [Computer software]. Retrieved from https://www.jamovi.org

UN General Assembly (2000), United Nations Millennium Declaration, United Nationa, available at: http://www.un.org/millennium/declaration/ares552e.htm (accessed on 18 December 2023).

UNESCO Institute for Statistics. (2006). Participation in Formal Technical and Vocational Education and Training Programmers Worldwide: An Initial Statistical Study. Bonn. UNESCO-UNEVOC.

UNESCO. (2013). Advancing TVET for youth employability and sustainable development. Bonn, DE: UNESCO-UNEVOC.

United Nations. (2015). Transforming our world: The 2030 agenda for sustainable development. United Nations. https://sdgs.un.org/2030agenda

UNESCO. (2015). Unleashing the Potential Transforming Technical and Vocational Education and Training.

Unleashing the potential: transforming technical and vocational education and training. (2015). *UNESCO eBooks*. https://doi.org/10.54675/hxes1603

Van der Klink, M. R., & Streumer, J. N. (2002). Effectiveness of on-the-job training. Journal of European Industrial Training, 26(2/3/4), 196-199. https://doi.org/10.1108/03090590210422076

World Bank. (2018). World Development Report 2018: Learning to Realize Education's Promise. Washington, DC: World Bank.

World Economic Forum (WEF). (2020). The Future of Jobs Report 2020. World Economic Forum. https://www.oecd.org/en/about/programmes/piaac.html

Wong, G. S., & Abdullah, N. S. (2025). Job readiness level to address 4.0 skills: An empirical study on TVET students in electrical and electronics field. Journal of Technical Education and Training, 17(1), 62–76. https://doi.org/10.30880/jtet.2025.17.01.005