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Bridging The Gap in Vocational Training: A Needs Assessment of Personalized Learning for Life and Career Skills in Southern Thailand

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Abstract

Driven by Industry 4.0 workforce demands, vocational education faces a critical challenge in aligning pedagogical practices with industrial needs. Grounded in Constructivist and Self-Regulated Learning theories, this study investigates the current and desired states of personalized learning management among vocational students in Southern Thailand and prioritizes the needs required to enhance essential life and career skills. Employing a quantitative needs assessment design, data were collected from 248 educational practitioners and administrators across 65 vocational colleges. The construct validity of the measurement instrument was rigorously verified through Confirmatory Factor Analysis (CFA). Data were analyzed using Paired-samples t-tests to establish inferential significance, alongside the Modified Priority Needs Index ($PNI_{modified}$) to strategically rank critical areas for development. The findings reveal a highly significant disparity ($p < .05$) between the cumulative current state of personalized learning implementation (Mean = 19.49, SD = 2.04) and the desired future state (Mean = 27.51, SD = 2.51). The needs assessment identified the "Role of the Instructor" as the paramount priority ($PNI_{modified}$ = 0.44), underscoring an urgent mandate to transition from traditional lecturers to learning coaches. This was followed closely by the need for "Learning Assessment Skills" ($PNI_{modified}$= 0.43), specifically prioritizing authentic and performance-based evaluation. The study confirms an urgent need for pedagogical transformation in technical and vocational education and training (TVET). By utilizing a robust needs assessment methodology, the findings provide a statistically validated, evidence-based framework for policymakers to prioritize human capital development specifically equipping instructors with coaching competencies and real-world assessment strategies to effectively bridge the skills gap.

1. Introduction

The Vocational Education Act (2008) mandates that vocational education and training must be managed in alignment with the National Economic and Social Development Plan and the National Education Plan to produce and develop a workforce at the skilled, technical, and technological levels, as well as to elevate vocational

education to a higher level to meet the demands of the labor market, through in-system, out-of-system, and dual-system education (Vocational Education Act, 2008). With 917 public and private institutions under the supervision of the Office of the Vocational Education Commission, over 205,000 vocational personnel are produced nationwide annually.

The government aims to promote the production of a vocational workforce to drive the Industry 4.0 policy, especially under the EEC framework, which requires up to 173,705 vocational workers. However, the production of personnel is still insufficient (Excess demand), and the quality of nearly 1 million students in public and private vocational colleges faces qualitative problems, including the quality of learners, the quality of instructors who still lack experience, and outdated curricula that are mostly not competency-based. These are urgent problems that need to be addressed (Chalamwong, 2019).

The vocational workforce faces critical qualitative challenges that undermine its effectiveness. Significant skills gaps exist between training curricula and industry requirements, particularly in emerging technologies (Ali et al., 2020; Chukwu et al., 2024). Competency-based training programs struggle with inadequate resources, poor instructor quality, and outdated equipment (Mgaya, 2023). Graduates encounter employment barriers due to insufficient practical experience and misaligned competencies (Juma, 2025; Orbeta & Corpus, 2024). Industry-education disconnects persist, with limited collaboration between training institutions and employers (Akter et al., 2024). Future skills mismatches threaten sustainable employment outcomes (Alam et al., 2024), while systemic policy gaps hinder workforce development effectiveness (Xiong & Chang, 2022).

Furthermore, a problem in Thai vocational education is that the workforce produced is of low quality and does not possess the competencies that employers need. The main cause is that curricula are not designed to be linked with real-world work skills (Rakkieatwong, 2016), and the learning management is still a one-size-fits-all model, not managed based on individual differences according to the nature and potential of each learner (Independent Committee for Education Reform [ICER], 2022). Additionally, the quality of education management must be improved to cover flexible, diverse, accurate, modern, and timely curricula and educational and learning processes (educational core processes), aiming for excellence and building the nation's competitiveness. This approach supports holistic human resource development across all life stages, ensuring alignment with the Thailand 4.0 model (Insuwan et al., 2018). Consequently, it involves building the competencies and characteristics of high-potential learners who are leaders and creators of new innovations (Secretariat of the Senate, 2020).

Solving the qualitative problem of the vocational workforce produced, in addition to having experts in professional groups help provide experiences for learners and organizing curricula in an interdisciplinary format, also requires managing learning so that learners can develop knowledge on their own. This will enable learners to choose what they need and are interested in, according to the different potentials of everyone, rather than just receiving knowledge fed from the instructor to the learner (Chairattanawan, 2018). This aligns with the Personalized Learning approach, which is a learning management method that can respond to the nature, needs, and individual differences of learners. It considers learners as the owners of their own learning; they define their own learning goals and methods, using self-discipline as a key tool to regulate and control themselves to be determined and make efforts in learning to their full potential, responding to the needs of each learner. It promotes and supports each learner to succeed in their learning, where each learner can use different learning methods and design different activities to achieve the same or related learning outcomes (Wongyai & Patphol, 2017). This type of Personalized Learning is highly suitable for managing vocational education to develop the competencies of vocational learners in the current era.

To prepare for setting guidelines for upgrading skills or producing a skilled workforce in the southern region to drive the economy with the smart electronics industry according to the Southern Development Plan, it is necessary to assess the needs, including the current state, desired state, and to prioritize both the knowledge and emerging skills required for the future. While the need for personalized learning is recognized nationally, a granular, region-specific needs assessment is critical for aligning vocational training with the unique economic goals of the Southern Region Development Plan. This study addresses that specific gap by assessing the needs to provide an evidence-based guideline for developing learning innovations for Personalized Learning to elevate the educational quality of vocational-level learners in the southern region of Thailand.

2. Literature Review and Theoretical Framework

2.1 Conceptual definition of Personalized Learning

Personalized Learning (PL) is an instructional paradigm that tailors learning experiences to the specific needs, preferences, abilities, and pace of individual learners, thereby enabling each learner to achieve optimal outcomes through customized pathways and robust support systems (Agrawal et al., 2025). Furthermore, PL is defined as a learner-centered educational approach that focuses on the backgrounds, needs, potential, and perceptions of learners (International Bureau of Education, 2017). Importantly, PL is rooted in the principle of "deep learning,"

which aligns with the intrinsic nature and needs of each student, recognizing learners as the active owners of their learning processes (Wongyai & Patphol, 2017). This perspective is particularly critical in Technical and Vocational Education and Training (TVET), a sector characterized by diverse learner abilities and varying career trajectories.

The theoretical foundation of PL is anchored in Constructivism, which posits that learners actively construct knowledge through authentic, contextualized experiences. In vocational education, this is actualized through work-based and practice-oriented learning environments (Chui et al., 2025). Additionally, Self-Regulated Learning (SRL) theory emphasizes the learner's capacity to autonomously plan, monitor, and evaluate their educational progress. PL environments, when supported by adaptive technologies, enhance SRL by enabling learners to regulate their learning via continuous feedback loops (Juan & Nagappan, 2025).

The integration of Artificial Intelligence (AI) further strengthens PL by facilitating adaptive systems capable of analyzing learner data to provide individualized instruction and competency-based progression (Yan et al., 2025; Hassan et al., 2024). Consequently, these intelligent systems support personalized skill development, significantly improving both learner engagement and long-term employability outcomes in TVET (Aswini et al., 2025). Thus, this study conceptualizes PL within TVET as a dynamic interaction among constructivist learning environments, SRL processes, and AI-driven adaptive systems, all underpinned by learner-centered principles, deep learning, and student ownership.

2.2 The Conceptual Framework

This research is established upon a conceptual framework that links the global demands of Industry 4.0 with the necessary pedagogical paradigm shifts in vocational education. The framework comprises the following interconnected pillars:

i) Workforce Demands (Industry 4.0)

Workforce demands in the Industry 4.0 era serve as a critical outcome variable reflecting the alignment between educational provision and the digital labor market. Under Constructivism, skill development occurs through authentic learning within real-world industrial contexts. Concurrently, SRL empowers learners to develop adaptability and lifelong learning capabilities, which are essential in the Industry 4.0 landscape. Research indicates that the modern workforce requires a combination of technical, digital, and soft skills, such as critical thinking and adaptability (Nurjanah et al., 2022; Husin et al., 2022). Furthermore, labor demands increasingly emphasize multidisciplinary competencies to support advanced technologies (Turcato et al., 2024). Therefore, PL in the TVET system plays a crucial role in cultivating a workforce that aligns with the complex demands of Industry 4.0.

ii) TVET Transformation

TVET Transformation is a vital process linked to the PL paradigm, focusing on developing learning systems responsive to both labor market needs and individual learners. Guided by Constructivist theory, TVET instruction must be rooted in authentic, practice-based learning, while SRL supports students in developing self-directed learning skills within an occupational context. Recent literature demonstrates that integrating AI and digital transformation within TVET enables the effective design of adaptive, competency-based curricula (Joseph et al., 2025; Onyango & Kelonye, 2022). Consequently, this transformation renders the vocational education system more flexible and aligned with future skill development.

iii) Personalized Learning Mechanisms

The mechanisms of PL represent the essential operational link translating Constructivism and SRL into practice. These mechanisms rely on AI, learning analytics, and adaptive systems to analyze learner data and adjust instruction in real-time (Hassan et al., 2024; Yan et al., 2025). However, the "heart" of this mechanism is Learner Diagnosis—a systematic process of analyzing an individual's potential, foundational knowledge, needs, and learning characteristics to design an appropriate Personalized Learning Pathway. This process aligns with SRL by fostering self-regulation through the awareness of personal strengths and weaknesses, allowing for the adjustment of learning strategies. Simultaneously, it aligns with Constructivism by creating meaningful, context-specific learning experiences. Furthermore, the concept of PL management comprises key components—principles, design, instructor roles, assessment, and perceived benefits (Wongyai & Patphol, 2017)—all of which must initiate from an accurate learner diagnosis. Therefore, learner diagnosis and the subsequent design of personalized pathways are the core mechanisms that create an environment conducive to maximizing learner potential, thereby making PL truly effective (Juan & Nagappan, 2025).

iv) Life and Career Skills

Life and Career Skills represent a critical outcome of PL within the TVET context. This outcome is strongly linked to SRL, which promotes lifelong learning and the learner's self-regulatory capacity. Concurrently, Constructivism supports skill development through practical experience and applied learning in occupational contexts. Studies indicate that AI-driven vocational training and intelligent learning environments significantly enhance essential skills such as problem-solving, teamwork, and overall employability (Agrawal et al., 2025; Chui et al., 2025). Furthermore, PL bridges learning with the students' career trajectories, leading to the development of competencies that meet labor market demands and ultimately closing the gap between education and employment (Rosyadi et al., 2023). Therefore, Life and Career Skills are not merely a technical outcome but the "ultimate outcome" focused on producing adaptable learners capable of lifelong learning and equipped with competencies aligned with the digital era's labor market.

3. Research Objectives

i. The objectives of this research are defined as follows:
ii. To investigate the current state and the desired state of personalized learning management for vocational students in Southern Thailand.
iii. To assess the priority needs for implementing personalized learning management using the Modified Priority Needs Index ($PNI_{modified}$).
iv. To rank the identified priority needs to provide a strategic framework for enhancing life and career skills in vocational education.

4. Research Methodology

4.1 Research Design

This study utilized a quantitative research approach employing a Needs Assessment Research design (Vongvanich, 2015). The primary objective was to empirically investigate the discrepancy between the current operational conditions (what is) and the desirable future state (what should be) of personalized learning management in vocational institutions.

4.2 Population and Sample

The population for this study comprised educational personnel affiliated with the Office of the Vocational Education Commission (OVEC) in Southern Thailand. A sample of 325 participants was selected using purposive sampling from 65 vocational institutions. This sampling technique was strategically employed to ensure the inclusion of key stakeholders—specifically administrators, heads of departments, curriculum developers, and instructors—who possess direct experience and distinct insight into instructional management policies and practices.

Justification of Sampling Strategy and Nonresponse Bias Analysis A purposive sampling strategy was deliberately chosen over random sampling to ensure that the respondents possessed the requisite pedagogical knowledge and direct administrative experience necessary to evaluate the complex constructs of personalized learning accurately. Selecting participants who are actively involved in curriculum implementation within the OVEC framework ensures the data reflects informed, professional perspectives rather than general opinions.

However, to address the inherent limitations of purposive sampling regarding generalizability, and to ensure the validity of the findings, a nonresponse bias analysis was considered. The response rate was robust at 76.30% (248 out of 325 distributed questionnaires). To verify that the non-respondents did not systematically differ from the respondents, early respondents (those who replied within the first two weeks) were compared with late respondents (those who replied after follow-up reminders), acting as a proxy for non-respondents. Preliminary comparisons across key demographic variables (e.g., institutional size, years of experience) revealed no statistically significant differences, suggesting that nonresponse bias does not pose a severe threat to the validity of the study's conclusions.

4.3 Instrument Development and Construct Operationalization

The primary instrument for data collection was a structured questionnaire developed by the researchers. To ensure that the instrument was highly applicable to the specific cultural and systemic nuances of the Thai vocational education system, the conceptual foundation for all dimensions of the questionnaire was primarily drawn from the Personalized Learning theoretical framework established by Wongyai and Patphol (2017). Their

framework is widely recognized for effectively translating abstract personalized learning concepts into practical pedagogical strategies within the Thai educational context.

However, to ensure robust construct validity and align the instrument with global TVET standards, the dimensions derived from Wongyai and Patphol (2017) were systematically cross-referenced and operationalized in conjunction with established international educational theories:

Dimensions 1 & 2: Principles and Design of Personalized Learning. Based on Wongyai and Patphol's criteria for learner-centric environments, these items measure the diagnosis of learner needs and the provision of diverse learning pathways. Theoretically, these operationalize the principles of Constructivism and adaptive learning systems, aligning with recent international models emphasizing diverse cognitive styles in TVET (Kang et al., 2025; Masih et al., 2025; Aswini et al., 2025)

Dimension 3: Role of the Instructor. Grounded in Wongyai and Patphol's mechanism of transforming the teacher into a facilitator, these items operationalize Vygotsky's concept of Scaffolding (Vygotsky, 1978). The indicators for mentoring and dynamic intervention parallel the "orchestration" competencies required globally for modern vocational instructors (Chui et al., 2025; Juan & Nagappan, 2025; Onyango & Kelonye, 2022)

Dimension 4: Learning Assessment Skills. Derived from Wongyai and Patphol's requirement for diverse evaluation methods, this dimension operationalizes Authentic and Performance-based Assessment. The items reflect the critical need to align classroom evaluation with real-world industry standards to close the vocational skills gap (Yan et al., 2025; Hassan et al., 2024; Devinta et al., 2024)

Dimensions 5 & 6: Perceived Benefits for Students and Instructors. These dimensions capture the projected outcomes of the Wongyai and Patphol framework. Theoretically, they operationalize the concepts of Self-Regulated Learning (SRL) and lifelong learning, mapping directly onto international demands for future skills matching and workforce adaptability in the Industry 4.0 era (Agrawal et al., 2025; Chui et al., 2025; Rosyadi et al., 2023)

Instrument Validation Process The development process followed a rigorous two-stage validation procedure to establish both content and construct validity:

Content Validity: The formulated items underwent a content validity verification process by a panel of five experts in vocational education and curriculum design. The validation yielded an Item-Objective Congruence (IOC) index ranging from 0.80 to 1.00, confirming that the items accurately represented the intended theoretical constructs.

Construct Validity and Reliability: To evaluate the dimensional structure of the instrument beyond expert opinion, a pilot test was conducted with a non-sample group of 30 vocational educators. A Cronbach's alpha coefficient of 0.90 was achieved, confirming high internal consistency across all items. Furthermore, to explicitly strengthen construct validity as recommended in recent educational measurement literature, the structural dimensions of the questionnaire were subjected to Confirmatory Factor Analysis (CFA) to statistically validate that the empirical data structurally fit the proposed six dimensions of the personalized learning framework.

4.4 Data Collection

The questionnaires were distributed to the target sample groups across the 65 identified institutions. A total of 248 complete and valid questionnaires were returned and utilized for the final data analysis, representing a response rate of 76.30%.

4.5 Data Analysis

The collected data were systematically analyzed using statistical software to ensure both descriptive clarity and inferential robustness. The analysis followed these sequential procedures:

Descriptive Statistics: Frequency and percentage distributions were utilized to profile the demographic characteristics of the respondents. Mean (M) and Standard Deviation (SD) were employed to quantify the levels of both the current state and the desired state of personalized learning management.

Construct Validity Analysis: To strictly address construct validity and empirically verify the dimensional structure of the developed instrument, Confirmatory Factor Analysis (CFA) was conducted to statistically verify how well the empirical data fit the proposed six-dimensional theoretical framework of personalized learning.

Inferential Statistics: To rigorously test the hypothesis and address whether a statistically significant gap exists between the current implementation and future expectations, a Paired-samples t-test was conducted. This analysis provided the necessary statistical confidence (p-value) to confirm the observed disparities.

Needs Assessment Analysis: To accurately prioritize the critical areas requiring immediate intervention, the Modified Priority Needs Index ($PNI_{modified}$) was calculated. The formula is defined as: $PNI_{modified} = (I - D) / D$, where 'I' represents the Desired State (Importance) and 'D' represents the Current State (Degree of Success). Justification of Methodological Choice: As established in educational needs assessment methodology (Vongvanich, 2015), $PNI_{modified}$ was deliberately selected over traditional discrepancy models (which simply subtract D from I). This

approach is highly robust because it calculates the magnitude of the gap relative to the current baseline, thereby preventing the prioritization matrix from being skewed by extreme outliers in desired expectations. This methodological choice aligns with recent rigorous TVET needs assessment studies, providing a statistically reliable framework for policy formulation that accurately reflects the proportion of need rather than merely the absolute difference.

5. Research Results

5.1 Demographic Characteristics of Respondents

The demographic profile of the respondents (N = 248) was analyzed to provide clear insight into the sample structure. As presented in Table 1, the sample predominantly consisted of instructors (71.77%), followed by heads of departments (19.35%), and administrators (2.42%). Regarding professional experience, a significant proportion of the respondents possessed over 10 years of experience in the vocational education sector (33.87%). Academically, the majority held Bachelor's degrees (68.15%), while a substantial portion had attained postgraduate qualifications, including Master's (25.00%) and Doctoral degrees (6.85%). Furthermore, the respondents were widely distributed across diverse technical disciplines, prominently in Industry (28.23%) and Commerce/Business Administration (21.37%). This demographic composition ensures that the evaluations of both current practices and desired states of personalized learning are grounded in substantial pedagogical expertise and practical institutional insight across multiple vocational domains.

Table 1 *Demographic profile of respondents (N = 248)*

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	100	40.32
	Female	148	59.68
Age	Under 30 years	57	22.98
	30 - 39 years	83	33.47
	40 - 49 years	85	34.27
	50 years and above	23	9.27
Educational Attainment	Bachelor’s Degree	169	68.15
	Master’s Degree	62	25
	Doctoral Degree	17	6.85
Position	Administrator	6	2.42
	Head of Department	48	19.35
	Head of Curriculum Development	6	2.42
	Instructor	178	71.77
	Other	10	4.03
Years of Experience	Less than 2 years	59	23.79
	2 - 5 years	47	18.95
	6 - 10 years	58	23.39
	More than 10 years	84	33.87
Level of Instruction*	Vocational Certificate	129	52
	High Vocational Certificate (Diploma)	104	41.94
	Bachelor’s Degree	15	6.05

Demographic Variable	Category	Frequency (n)	Percentage (%)
Subject Area Taught	General Education	34	13.71
	Industry / Engineering	70	28.23
	Commerce / Business Administration	53	21.37
	Home Economics	10	4.03
	Agriculture	34	13.71
	Fisheries	10	4.03
	Tourism Industry	10	4.03
	Textile Industry	2	0.81
	Merchant Marine	4	1.61
	Information and Communication Technology (ICT)	21	8.47

5.2 Construct Validity of the Measurement Model

Before conducting the comparative needs assessment, the construct validity and dimensional suitability of the 29-item instrument were statistically verified. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy indicated that the data were highly suitable for factor analysis, yielding exceptional values of 0.939 for the Current States and 0.947 for the Desired States. Both values far exceed the recommended threshold of 0.60. Furthermore, Bartlett's Test of Sphericity was highly significant for both the Current States (Chi-square = 6097.09, $p < .001$) and the Desired States (Chi-square = 5640.10, $p < .001$). Pearson correlation coefficients among all observed variables demonstrated positive and statistically significant relationships at the .05 level. These robust preliminary statistics empirically validate the construct validity and the six-dimensional structure of the personalized learning management model, ensuring that the subsequent needs assessment is based on a psychometrically sound foundation.

5.3 Inferential Analysis of Current and Desired States

To address whether a statistically significant gap exists between current implementation practices and future expectations, a Paired-Samples t-test was conducted. The analysis provides rigorous inferential evidence to support the needs assessment findings. As presented in Table 2, the overall current state of personalized learning management was rated at a moderate level, whereas the desired state was overwhelmingly rated at a very high level.

Crucially, the overall paired t-test analysis (N = 248) revealed a highly significant disparity between the cumulative current state (Mean = 19.49, SD = 2.04) and the desired state (Mean = 27.51, SD = 2.51). This overall gap was statistically significant, $t(247) = 37.147$, $p < .05$. Furthermore, when analyzing the specific dimensions, every individual component demonstrated a statistically significant difference at the .05 level, with t-values ranging from 28.27 to 36.79.

Table 2 *Inferential comparison of current and desired states of personalized learning management* **(*N = 248*)**

Evaluation Criteria	Current States		Desired States		df	t	P(sig)
	Mean	S.D.	Mean	S.D.			
1. Principles of Personalized Learning	3.3	0.43	4.5	0.58	247	28.27	0.00*
2. Design of Personalized Learning	3.22	0.39	4.58	0.47	247	32.24	0.00*
3. Role of the Instructor	3.22	0.37	4.64	0.43	247	36.79	0.00*
4. Learning Assessment Skills	3.2	0.37	4.58	0.48	247	35.64	0.00*
5. Perceived Benefits for Students	3.35	0.43	4.62	0.47	247	33.1	0.00*
6. Perceived Benefits for Instructors	3.35	0.43	4.62	0.47	247	30.64	0.00*
Overall	19.49	2.04	27.51	2.51	247	37.15	0.00*

*Note: Statistically significant at the .05 level. (df = 247 for all comparisons)

Table 2: These inferential statistics definitively confirm that the identified need for pedagogical transformation is robust and not due to chance. The most profound statistical gap is observed in the "Role of the Instructor" (t = 36.79), mathematically corroborating that transitioning teachers from traditional lecturers to learning facilitators is the most urgent institutional requirement.

5.4 Overall Priority Needs Assessment ($PNI_{modified}$)

The Modified Priority Needs Index ($PNI_{modified}$) was calculated to identify which areas require the most urgent attention. The results are ranked in Table 3.

Table 3 *Overall priority needs analysis for personalized learning management*

Evaluation Item	Desired State			Priority Needs	
	Mean	S.D.	Meaning	$PNI_{modified}$	Rank
1. Principles of Personalized Learning	4.51	0.68	High	0.37	5
2. Design of Personalized Learning	4.58	0.57	Very High	0.42	3
3. Role of the Instructor	4.64	0.54	Very High	0.44	1
4. Learning Assessment Skills	4.58	0.59	Very High	0.43	2
5. Perceived Benefits for Students	4.58	0.58	Very High	0.43	2
6. Perceived Benefits for Instructors	4.62	0.56	Very High	0.38	4

Table 3: highlights that the "Role of the Instructor" is the highest priority need ($PNI_{modified}$=0.44). This indicates that the most critical gap to bridge is the transformation of the teacher's function. Following closely are "Learning Assessment Skills" and "Perceived Benefits for Students" (both at $PNI_{modified}$=0.43), emphasizing the need for better evaluation tools and clearer student outcomes.

5.5 In-Depth Analysis of Specific Priority Needs

To provide actionable insights, the study further analyzed the specific indicators within each major aspect. The detailed results are presented in Tables 4-9.

Table 4 *Priority needs for* "*Principles of personalized learning*"

Evaluation Item	Desired State			Priority Needs	
	Mean	S.D.	Meaning	$PNI_{modified}$	Rank
1. Having a good and conducive learning environment	4.55	0.65	Very High	0.44	1
2. Providing learning based on learners' goals and methods	4.51	0.69	Very High	0.35	4
3. Having diverse and interesting learning channels	4.58	0.61	Very High	0.39	3
4. Learners' self-discipline in learning	4.42	0.75	High	0.42	2
5.Providing learning based on learners' nature and needs	4.48	0.68	High	0.26	5

Table 4: Principles of Personalized Learning Regarding the principles of personalized learning, "having a good and conducive learning environment" is the first priority need ($PNI_{modified}$=0.44), followed by "learners' self-discipline in learning" ($PNI_{modified}$=0.42), and the last priority is "providing learning based on learners' nature and needs" ($PNI_{modified}$=0.26).

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Table 5 *Priority needs for "Design of personalized learning"*

Evaluation Item	Desired State			Priority Needs	
	Mean	S.D.	Meaning	$PNI_{modified}$	Rank
1. Analyzing the nature and needs of learners	4.59	0.60	Very High	0.43	1
2. Defining diverse learning channels	4.59	0.55	Very High	0.42	3
3. Designing diverse learning activities	4.61	0.54	Very High	0.43	2
4. Implementing learning activities as designed	4.58	0.56	Very High	0.41	5
5. Using diverse authentic assessments	4.52	0.58	Very High	0.41	4

Table 5: Design of Personalized Learning Regarding the design of personalized learning, "analyzing the nature and needs of learners" is the first priority need ($PNI_{modified}$=0.43), followed by "defining diverse learning channels" ($PNI_{modified}$=0.42), and the last priority is "implementing learning activities as designed" ($PNI_{modified}$=0.41).

Table 6 *Priority needs for "Role of the instructor"*

Evaluation Item	Desired State			Priority Needs	
	Mean	S.D.	Meaning	$PNI_{modified}$	Rank
1. Creating a conducive learning atmosphere	4.66	0.55	Very High	0.45	4
2. Using stimulating questions to encourage self-thinking	4.65	0.53	Very High	0.44	7
3. Encouraging diverse learning processes	4.64	0.54	Very High	0.44	5
4. Encouraging learners to find solutions	4.69	0.50	Very High	0.47	1
5. Assisting learners to achieve success	4.67	0.53	Very High	0.45	2
6. Coordinating networks and learning resources	4.54	0.61	Very High	0.41	9
7. Monitoring and tracking learning progress	4.65	0.55	Very High	0.44	6
8. Evaluating and providing feedback	4.58	0.57	Very High	0.41	8
9. Updating learning activities to be modern	4.67	0.52	Very High	0.45	3

Table 6: Role of the Instructor Regarding the role of the instructor, "encouraging learners to find solutions" is the first priority need ($PNI_{modified}$=0.47), followed by "assisting learners to achieve success" ($PNI_{modified}$=0.45), and the last priority is "coordinating networks and learning resources" ($PNI_{modified}$=0.41).

Table 7 *Priority needs for "Learning assessment skills"*

Evaluation Item	Desired State			Priority Needs	
	Mean	S.D.	Meaning	$PNI_{modified}$	Rank
1. Authentic Assessment	4.70	0.49	Very High	0.48	1
2. Performance-based assessment	4.69	0.54	Very High	0.47	2
3. Immediate Feedback	4.51	0.60	Very High	0.39	5
4. Learners can define their own assessment methods and criteria	4.48	0.68	High	0.40	4
5. Learners can adapt assessment methods to their ability	4.50	0.64	High	0.41	3

Table 7: Learning Assessment Skills Regarding learning assessment skills, "Authentic Assessment" is the first priority need ($PNI_{modified}$=0.48), followed by "performance-based assessment" ($PNI_{modified}$=0.47), and the last priority is "immediate feedback" ($PNI_{modified}$=0.39).

Table 8 *Priority needs for* "*Perceived benefits for students*"

Evaluation Item	Desired State			Priority Needs	
	Mean	S.D.	Meaning	$PNI_{modified}$	Rank
1. Learners use their potential and generate their own learning power	4.57	0.60	Very High	0.43	3
2. Learners are motivated to learn	4.57	0.63	Very High	0.43	4
3. Learners have more opportunities to achieve learning outcomes	4.56	0.59	Very High	0.41	5
4. Learners have the opportunity to use diverse learning methods	4.63	0.55	Very High	0.45	2
5. Fostering the characteristic of lifelong learning	4.59	0.55	Very High	0.45	1

Table 8: Perceived Benefits for Students Regarding perceived benefits for students, "fostering the characteristic of lifelong learning" is the first priority need ($PNI_{modified}$=0.45), followed by "learners using their potential to generate their own learning power" ($PNI_{modified}$=0.43), and the last priority is "learners having more opportunities to achieve learning outcomes" ($PNI_{modified}$=0.41).

Table 9 *Priority needs for* "*Perceived benefits for instructors*"

Evaluation Item	Desired State			Priority Needs	
	Mean	S.D.	Meaning	$PNI_{modified}$	Rank
1. Instructors can develop students for success in competency-based learning	4.60	0.57	Very High	0.42	2
2. Instructors can transition their role to that of a Coach	4.62	0.56	Very High	0.43	1
3. Instructors can support learners according to their learning status	4.62	0.56	Very High	0.38	4
4. Instructors can design diverse learning experiences	4.63	0.56	Very High	0.39	3
5.Instructors can keep their skills updated with changing technology	4.64	0.55	Very High	0.29	5

Table 9: Perceived Benefits for Instructors Regarding perceived benefits for instructors, "instructors transitioning their role to that of a Coach" is the first priority need ($PNI_{modified}$=0.43), followed by "instructors developing students for success in competency-based learning" ($PNI_{modified}$=0.42), and the last priority is "instructors keeping their skills updated with changing technology" ($PNI_{modified}$=0.29).

5.6 Results of Ranking the Priority Needs for Personalized Learning Management

To provide a clear strategic roadmap, the study ranked the priority needs based on the Modified Priority Needs Index ($PNI_{modified}$) across all dimensions. The rankings are categorized into three paired tables (Tables 10, 11, and 12) as follows:

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Table 10 *Ranking of priority needs for* "*Principles*" *and* "*Design*" *of personalized learning*

Rank	Principles of Personalized Learning	PNI	Design of Personalized Learning	PNI
1	Providing learning based on learners' nature and needs	0.44	Analyzing the nature and needs of learners	0.43
2	Learners' self-discipline in learning	0.42	Designing diverse learning activities	0.43
3	Having diverse and interesting learning channels	0.39	Defining diverse learning channels	0.42
4	Providing learning based on learners' goals and methods	0.35	Using diverse authentic assessments	0.41
5	Having a good and conducive learning environment	0.26	Implementing learning activities as designed	0.41

Principles of Personalized Learning: The first priority need is "providing learning based on learners' nature and needs" ($PNI_{modified}$=0.44), followed by "learners' self-discipline in learning" ($PN_{Imodified}$=0.42), and the last priority is "having a good and conducive learning environment" ($PNI_{modified}$=0.26).

Design of Personalized Learning: The first priority need is "analyzing the nature and needs of learners" ($PNI_{modified}$=0.43), followed by "designing diverse learning activities" ($PNI_{modified}$=0.43), and the last priority is "implementing learning activities as designed" ($PNI_{modified}$=0.41).

Table 11 *Ranking of priority needs for* "*Role of the instructor*" *and* "*Learning assessment skills*"

Rank	Role of the Instructor	PNI	Learning Assessment Skills	PNI
1	Encouraging learners to find solutions	0.47	Authentic Assessment	0.48
2	Assisting learners to achieve success	0.45	Performance-based assessment	0.47
3	Updating learning activities to be modern	0.45	Learners can adapt assessment methods to their ability	0.41
4	Creating a conducive learning atmosphere	0.45	Learners can define their own assessment methods	0.40
5	Encouraging diverse learning processes	0.44	Immediate Feedback	0.39
6	Monitoring and tracking learning progress	0.44		
7	Using stimulating questions to encourage self-thinking	0.44		
8	Evaluating and providing feedback	0.41		
9	Coordinating networks and learning resources	0.41		

Role of the Instructor: The first priority need is "encouraging learners to find solutions" ($PNI_{modified}$=0.47), followed by "assisting learners to achieve success" ($PNI_{modified}$=0.45), and the last priority is "coordinating networks and learning resources" ($PNI_{modified}$=0.41).

Learning Assessment Skills: The first priority need is "Authentic Assessment" ($PNI_{modified}$=0.48), followed by "performance-based assessment" ($PNI_{modified}$=0.47), and the last priority is "immediate feedback" ($PNI_{modified}$=0.39).

Table 12 *Ranking of priority needs for* "*Perceived benefits for students*" *and* "*Instructors*"

Rank	Perceived Benefits for Students	PNI	Perceived Benefits for Instructors	PNI
1	Fostering the characteristic of lifelong learning	0.45	Instructors can transition their role to that of a Coach	0.43
2	Learners have the opportunity to use diverse learning methods	0.45	Instructors can develop students for success in competency-based learning	0.42
3	Learners use their potential and generate their own learning power	0.43	Instructors can design diverse learning experiences	0.39
4	Learners are motivated to learn	0.43	Instructors can support learners according to their learning status	0.38
5	Learners have more opportunities to achieve learning outcomes than in regular learning	0.41	Instructors can keep their skills updated with changing technology	0.29

Perceived Benefits for Students: The first priority need is "fostering the characteristic of lifelong learning" ($PNI_{modified}$=0.45), followed by "learners having the opportunity to use diverse learning methods" (PNImodified=0.45), and the last priority is "learners having more opportunities to achieve learning outcomes" ($PNI_{modified}$=0.41).

Perceived Benefits for Instructors: The first priority need is "instructors transitioning their role to that of a Coach" ($PNI_{modified}$=0.43), followed by "instructors developing students for success in competency-based learning" ($PNI_{modified}$=0.42), and the last priority is "instructors keeping their skills updated with changing technology" ($PNI_{modified}$=0.29).

6. Discussion and Conclusion

This study provides empirical evidence of a critical disparity in the vocational education system of Southern Thailand. The inferential findings confirm a statistically significant gap between the cumulative current state of personalized learning management (Mean = 19.49, SD = 2.04) and the highly anticipated desired state (Mean = 27.51, SD = 2.51). This pronounced disconnect highlights that while the philosophy of personalized learning is widely accepted as a necessity for modern workforce development, its practical implementation is currently lagging due to systemic barriers in pedagogy and assessment.

The application of the Modified Priority Needs Index ($PNI_{modified}$) successfully pinpointed the levers required for transformation. The analysis identified that the highest priority need is not merely physical resources, but the evolution of the Role of the Instructor ($PNI_{modified}$=0.44). There is an urgent demand for instructors to transition from traditional "content deliverers" to "learning coaches" and "facilitators." This need is inextricably linked to the second highest priority: the development of Learning Assessment Skills ($PNI_{modified}$=0.43), specifically the ability to design and implement authentic, performance-based assessments that reflect real-world industry standards.

In conclusion, to effectively bridge the skills gap and align with the economic goals of the Southern Region Development Plan, vocational institutions must prioritize a fundamental pedagogical shift. Policy and professional development initiatives should focus on empowering instructors with coaching competencies and modern assessment tools. Only by transforming the classroom environment into a learner-centered ecosystem can vocational education successfully foster the life and career skills necessary for the Industry 4.0 era.

The findings of this study reveal a critical mandate for transforming vocational education in Southern Thailand. The significant gap between the current state (Mean=19.49) and the desired state (Mean=27.51) of personalized learning management reflects not only a local challenge but a systemic issue that resonates with global vocational education and training (TVET) concerns.

6.1 The Imperative for Instructor Transformation

The study identified the "Role of the Instructor" as the highest priority need ($PN_{Imodified}$=0.44). Instructors and administrators strongly agree that teachers must transition from "content deliverers" to "coaches." This aligns directly with the personalized learning framework proposed by Wongyai and Patphol (2017), which emphasizes that the primary mechanism for personalized learning is the teacher's ability to facilitate self-discipline and goal setting. However, implementing this shift is challenging. As noted by Mgaya (2023), competency-based training programs globally struggle with "poor instructor quality" and a lack of preparedness for modern pedagogical roles. The findings here suggest that while Thai educators aspire to this coaching role, they currently lack the

specific skills to execute it, mirroring the systemic gaps hindering workforce development effectiveness identified by Xiong and Chang (2022).

6.2 Bridging The Skills Gap Through Authentic Assessment

The urgent demand for "Authentic Assessment" ($PNI_{modified}$=0.48) underscores a rejection of traditional testing methods that fail to measure real-world competence. This finding directly addresses the core problem highlighted by Rakkieatwong (2016), who argued that Thai vocational curricula are disconnected from actual work skills. By prioritizing performance-based assessment, this study proposes a concrete solution to the "skills gaps in emerging technologies" identified by Ali et al. (2020) and Chukwu et al. (2024). Without changing how students are assessed, institutions cannot effectively signal to employers that graduates possess the necessary practical experience, a barrier to employment noted by Juma (2025) and Orbeta and Corpus (2024).

6.3 Fostering Lifelong Learning to Mitigate Future Mismatches

The high priority placed on "Fostering Lifelong Learning" ($PNI_{modified}$=0.45) indicates a strategic awareness that technical skills alone are insufficient. This aligns with the Independent Committee for Education Reform (2022), which calls for learners who can innovate and self-regulate. In a rapidly changing economy, the ability to learn continuously is the only buffer against the "future skills mismatches" warned of by Alam et al. (2024). Furthermore, the disconnect between education and industry noted by Akter et al. (2024) can be partially bridged by producing adaptable learners who can evolve alongside industry requirements.

6.4 Alignment with Policy and Practice

Overall, the findings confirm that the qualitative crisis in Thai vocational education—highlighted by Chalamwong (2019) as an urgent issue of "excess demand" but "low quality"—cannot be solved by curriculum reform alone. It requires a holistic change in the learning ecosystem. The data supports the mandate of the Vocational Education Act (2008) but illustrates that compliance requires active pedagogical innovation. The "one-size-fits-all" model is obsolete; to produce the high-potential workforce required for the EEC and Southern regional development, the system must empower instructors to act as the primary agents of personalized, competency-based transformation.

7. Limitations

While this study provides valuable insights into the priority needs for personalized learning in Southern Thailand, several limitations should be acknowledged to contextualize the findings:

Generalizability: The use of purposive sampling to select participants from vocational institutions specifically in Southern Thailand limits the generalizability of the results to other regions or the entire nation. The unique economic and cultural context of the South may influence the specific needs identified.

Self-Report Bias: The data were collected via self-report questionnaires, which may be subject to social desirability bias. Participants might have rated the "desired state" higher than their true expectations to align with perceived educational ideals, potentially inflating the needs assessment gaps.

Scope of Inquiry: This research aimed to identify what is needed (Needs Assessment) but did not empirically test how to implement these changes effectively. Consequently, the study points to the direction for reform but does not provide a verified model for execution.

8. Implications

8.1 Theoretical Implications

This study expands the existing body of knowledge in vocational education management by demonstrating that the core of personalized learning in TVET is not solely contingent upon technological infrastructure; rather, it necessitates a fundamental "Instructor Transformation." It highlights the critical pedagogical shift from a traditional "content deliverer" to a "learning coach." Furthermore, the findings empirically validate the efficacy of the Modified Priority Needs Index ($PNI_{modified}$) in precisely identifying the disparities between current states and desired outcomes at a regional level. This methodological approach provides a highly adaptable model for conducting rigorous needs assessments in diverse TVET contexts globally.

8.2 Practical Implications for Policy and Instruction

a) For Policymakers: Educational authorities must pivot their strategic investments from a predominantly physical infrastructure focus toward robust human capital development. Specifically, it is imperative to establish long-term professional development programs designed to equip vocational educators with advanced coaching competencies and proficiency in authentic assessment.

b) For Instructional Practice: Vocational institutions should proactively develop "Personalized Learning (PL) Prototype Packages" tailored to specific technical disciplines. Concurrently, the establishment of Professional Learning Communities (PLCs) is strongly recommended to provide a collaborative platform for instructors to share best practices and seamlessly navigate the complexities of this pedagogical role transition.

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Conflict of Interest

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

Author Contribution

The authors confirm contribution to the paper as follows: ***study conception and design****: Chaiya Tanaphatsiri, Piya Prasongchan;* ***data collection****: Chaiya Tanaphatsiri;* ***analysis and interpretation of results****: Chaiya Tanaphatsiri, Piya Prasongchan;* ***draft manuscript preparation****: Chaiya Tanaphatsiri. All authors reviewed the results and approved the final version of the manuscript.*

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