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Innovative Competency Development of Vocational Teachers Through Professional Learning Community: A Participatory Action Research

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Abstract

This research aimed to 1) study the components and indicators of innovative competency of vocational teachers, 2) study the current status, desired status and needs in developing innovative competency of vocational teachers, 3) develop innovative competency of vocational teachers through professional learning communities, and 4) evaluate the outcomes of innovative competency development of vocational teachers. The research was divided into 4 phases: Phase 1 studied the components and indicators of innovative competency of vocational teachers. The informants were 9 qualified persons who were selected by purposive selection. Phase 2 studied the current status, desired status and needs in developing innovative competency of vocational teachers. The sample group was 234 administrators and teachers from government vocational education institutions in Roi Et Province, selected by stratified random sampling. Phase 3 developed innovative competency of vocational teachers through professional learning communities. The target group was 9 teachers who volunteered to participate in the development. Phase 4 evaluated the outcomes of developing innovative competency of vocational teachers. The informants were 9 teachers who volunteered to participate in the development. The research instruments were interview forms, observation forms, assessment forms, and questionnaires, with a reliability of 0.937 for the entire questionnaire. Data were analyzed using basic statistics, the priority need index, and inductive analysis.The research results found that:There were 4 components and 14 indicators of innovation competence in vocational education teachers, consisting of: 1) Creativity, with 4 indicators; 2) Application of knowledge to develop innovation, with 3 indicators; 3) Creative confidence, with 3 indicators; and 4) Teamwork, with 4 indicators.The current state of innovation competence in vocational education teachers is at a high level, and the overall desired state is at the highest level. The needs for innovation competence development in vocational education teachers are ranked as follows: 1) Application of knowledge to develop innovation; 2) Creative thinking; and 3) Creative confidence and teamwork, which have the same need index for development.The results of the development of innovative competence of vocational teachers with professional learning communities in 4 components, 14 empirical goals in the first round of research, 9 items were successfully developed, 5 items were not successfully developed, namely 1) teachers think outside the box to create works, 2) teachers have new ideas that are useful, 3) teachers design innovations, 4) teachers have skills in testing innovations, and 5) teachers can communicate effectively. When developing again in the second round of research, all empirical goals were successfully developed. The results of the development of innovative competence of vocational teachers through professional learning communities found that there was a change resulting from learning by doing at the individual, group, and organizational levels. At the individual level, there was learning from following the research steps, there was an exchange of knowledge and experiences about creating inventions and innovations continuously. At the group level, there was a culture of systematic collaboration and a strong network of innovative teachers within the educational institution. At the organizational level, executives, teachers, and personnel had an effective knowledge management approach for developing innovative competence of teachers, an organizational culture that emphasized learning by doing, and the overall product innovation evaluation results were at a very good leve.

Keywords: *Innovation Competency, Vocational Education, Professional Learning Communities, Participatory Action Research, Teacher Development.*

Introduction

The global economy increasingly relies on knowledge and innovation as primary drivers of growth. Economically advanced nations often achieve success through their ability to innovate, as evidenced by global competitiveness indices that emphasize innovation as a critical factor. According to the World Economic Forum (WEF), countries are categorized based on economic development into three groups: factor-driven, efficiency-driven, and innovation-driven economies. Thailand, positioned between the second and third categories, faces the challenge of overcoming the middle-income trap. While the country's

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competitiveness index has improved, its global ranking has declined, partly due to low scores in innovation capability.

Aligned with Thailand's 20-year national strategy (2018-2037) and the Thailand 4.0 policy, which envisions a value-based, innovation-driven economy, the development of human resources is paramount. This includes fostering 21st-century skills and nurturing innovators who can contribute to the economy's transformation. Recent indices rank Thailand 43rd globally for innovation potential, indicating substantial opportunities for growth and investment. To harness this potential, the education sector especially vocational education must prioritize the cultivation of innovation among teachers and students.

However, vocational education in Thailand faces significant challenges, including a lack of structured professional development programs tailored to foster innovation competencies. Many vocational teachers struggle with outdated teaching methods and insufficient support to implement innovative practices. Additionally, there is a disconnect between industry needs and the skills imparted by vocational institutions, further compounding the issue. These gaps highlight an urgent need for targeted interventions to bridge the competency divide and align educational outcomes with economic demands.

Teachers are pivotal in driving educational transformation, as emphasized by the OECD and educational research organizations. The preparation and continuous professional development of teachers are essential to achieving quality education outcomes. For vocational education, this entails equipping teachers with the competencies required to guide students in developing innovative skills. Among these competencies, innovative competency is crucial, encompassing creative thinking, knowledge application, constructive confidence, and teamwork. These attributes enable educators to inspire students and facilitate practical and marketable innovations.

Given the dynamic nature of today's society and its impact on education, vocational teachers must continuously update their knowledge, skills, and attitudes. This necessity aligns with McClelland's competency framework, which highlights behavioral characteristics such as knowledge, skills, and motives that differentiate high performers in an organization. Innovative competency specifically involves recognizing opportunities for change, leveraging new ideas, and developing innovations within real-world contexts.

To address these needs, this study adopts a Professional Learning Community (PLC) approach, leveraging collaborative professional environments to enhance innovation competencies among vocational teachers. This research seeks to establish evidence-based strategies for integrating PLCs into vocational education, contributing to both individual teacher development and broader educational reform initiatives.

Research Objectives

To study the components and indicators of innovation competency of vocational teachers

To study the current situation, desired conditions and needs for developing innovation competency of vocational teachers

To develop innovation competency of vocational teachers with professional learning communities

To evaluate the results of developing innovation competency of vocational teachers

Literature Review

Innovation competency has been a focal point in educational research, particularly in vocational education. Over the past decade, studies have emphasized the necessity of equipping teachers with the skills required to foster innovation among students, aligning with the demands of an ever-evolving labor market. McClelland's competency framework (1973) serves as a foundation for understanding how behavioral

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characteristics such as knowledge, skills, and attitudes influence performance. Subsequent research has expanded on this framework, emphasizing its applicability in vocational education contexts.

Recent studies, such as those by Hero et al. (2017) and Adepoju & Nwulu (2020), highlight the significance of creative thinking, collaborative practices, and adaptive knowledge application as critical components of innovation competency. These studies also identify gaps in professional development programs, which often lack the structured, ongoing support needed to foster these skills. For instance, the absence of collaborative environments where teachers can share practices and learn from peers has been cited as a significant barrier to innovation (Wagner, 2012).

Professional Learning Communities (PLCs) have emerged as a promising solution, as evidenced by research from DuFour et al. (2010) and Vescio et al. (2008). PLCs provide a structured platform for collaborative learning and professional growth, enabling teachers to refine their practices and adopt innovative approaches. In vocational education, studies by Raudasoja & Kaitala (2019) and Kieu (2017) demonstrate the efficacy of PLCs in enhancing teacher competency and aligning educational outcomes with industry requirements.

Despite these advancements, there remains a paucity of research exploring the integration of PLCs specifically designed to develop innovation competency in vocational teachers. This gap underscores the importance and necessity of the present study, which aims to address these shortcomings by implementing a PLC-based intervention using Participatory Action Research (PAR). By leveraging insights from prior research and building on established frameworks, this study seeks to contribute a replicable model for integrating innovation competency into vocational education.

This study focused on developing the innovation competency of vocational teachers based on four key components: creative thinking, application of knowledge for innovation development, constructive confidence, and teamwork. These components align with the concepts proposed by Wichai Wongyai and Marut Pattanaphon (2019). The study utilized participatory action research (PAR) and applied the research cycle framework by Kemmis and McTaggart (1988), which enables a dynamic and continuous research process. This process consists of four main activities: collaborative planning, collaborative action, collaborative observation, and collaborative reflection. It is a reflective approach designed to help the research group identify appropriate practices.

The study also incorporated the professional learning community (PLC) framework outlined by the Office of Vocational Teacher and Personnel Competency Development (2018). This framework comprises five essential elements: 1) shared vision, 2) collaborative teamwork, 3) shared leadership, 4) caring community, and 5) supportive structure. These principles were applied to foster collaboration and commitment in developing vocational teachers' innovation competencies.

The objective was to enable teachers to develop students into innovators by jointly setting learning goals, evaluating individual and collective outcomes, and engaging in knowledge exchange, critique, and teamwork. The process emphasizes structured timelines and active participation, ensuring effective collaboration and shared responsibility.

Methods

This study utilized Participatory Action Research (PAR) to investigate and enhance the innovation competency of vocational teachers through Professional Learning Communities (PLCs). The research was conducted in four phases:

Identifying Components and Indicators: A literature review and expert consultations were conducted to identify the components and indicators of innovation competency.

Key steps included:

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Reviewing theoretical frameworks and relevant literature to establish foundational principles.

Synthesizing components into four main areas: creative thinking, knowledge application for innovation, constructive confidence, and teamwork.

Validating these components and indicators through semi-structured interviews with nine experts, including policymakers, academic administrators, and experienced innovation mentors.

Assessing Current and Desired States: A survey and focus group discussions were used to evaluate the current state, desired state, and needs for developing innovation competencies among nine vocational teachers.

This phase involved:

Creating questionnaires to evaluate the present and desired states of innovation competency.

Collecting data from 234 participants, including teachers and administrators, using stratified random sampling.

Analyzing data to identify priority areas for development using the Priority Needs Index (PNI).

Implementing PLC-based Intervention: The PLC intervention was implemented in two iterative cycles, each involving planning, action, observation, and reflection. Collaborative workshops and peer feedback sessions were integral components of this phase.

Cycle 1

Planning: Collaboratively identifying challenges and designing development activities.

Acting: Implementing activities based on agreed-upon action plans.

Observing: Monitoring outcomes and gathering feedback.

Reflecting: Evaluating results and identifying areas for improvement.

Cycle 2

Re-planning: Addressing issues identified in Cycle 1.

Re-acting: Refining activities for enhanced outcomes.

Re-observing: Revising monitoring methods.

Re-reflecting: Synthesizing lessons learned to inform future actions.

Evaluating Outcomes: Outcomes were assessed at individual, group, and institutional levels, focusing on behavioral changes, collaborative practices, and institutional capacity building. Self-assessments and peer evaluations were used to measure progress against established indicators.

Methodological Tools

The research employed a range of tools, including:

- Semi-structured Interviews**:** Validated components and gathered expert insights.
- Questionnaires: Assessed competency levels and developmental needs.

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- Observation Forms: Monitored progress during PLC activities.
- Evaluation Rubrics: Measured innovation outcomes using qualitative scoring criteria.

Results

Analysis of Components and Indicators of Innovation Competency for Vocational Teachers

Components	**Indicators**
1) Creative Thinking	1. Thinking outside the box to create work 2. Embracing diverse perspectives 3. Connecting ideas to generate new knowledge 4. Initiating innovative and beneficial ideas.
2) Application of Knowledge for Innovation Development	1. Integrating knowledge 2. Designing innovations 3. Experimenting with creating innovations
3) Constructive Confidence	1. Positive mindset 2. Self-efficacy 3. Determination to achieve success.
4) Teamwork	1. Collaboration in work 2. Collaborative learning 3. Effective communication 4. Adaptability to situations

The study identified four components and 14 indicators of innovation competency for vocational teachers:

Creative Thinking (4 indicators): Thinking outside the box to create work, Embracing diverse perspectives, Connecting ideas to generate new knowledge and Initiating innovative and beneficial ideas.

Application of Knowledge for Innovation Development (3 indicators): Integrating knowledge, Designing innovations and Experimenting with creating innovations.

3) Constructive Confidence (3 indicators): Positive mindset, Self-efficacy and

Determination to achieve success.

Teamwork (4 indicators): Collaboration in work, Collaborative learning, Effective communication and Adaptability to situations.

The 14 indicators were validated as comprehensive and suitable for developing innovation competencies in the vocational education context.

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Current, Desired, and Essential Conditions for Developing Innovation Competency

Component	Current Conditions			Desired Conditions			PNI modified	Rank
	$\bar{x}$	S.D.	Result	$\bar{x}$	S.D.	Result		
1. Application of Knowledge for Innovation Development	3.86	0.60	High	4.63	0.47	Highest	0.20	1
2. Creative Thinking	4.08	0.56	High	4.71	0.39	Highest	0.15	2
3. Constructive Confidence	4.20	0.55	High	4.73	0.40	Highest	0.13	3
4. Teamwork	4.24	0.58	High	4.80	0.35	Highest	0.13	3
Summary	**4.10**	**0.51**	**High**	**4.72**	**0.35**	**Highest**		

Current Status of Innovation Competencies**:** Vocational teachers' innovation competencies are generally at a high level. However, the lowest-rated competency is applying knowledge to develop innovations. This gap may stem from insufficient training focused on skills like innovation design, testing, and outcome evaluation. Teachers often lack resources, modern equipment, and funding essential for innovation development. Moreover, the absence of professional learning communities (PLC) in some contexts reduces opportunities for knowledge-sharing and collaborative innovation efforts.

Desired State of Innovation Competencies: The desired state for vocational teachers' innovation competencies is rated at the highest level, particularly in teamwork. Vocational education inherently requires interdisciplinary collaboration due to its practical and specialized nature. Teachers must work closely to integrate knowledge, foster innovation, and adapt to rapidly evolving technologies.

Needs for Innovation Competency Development: The greatest need lies in applying knowledge to create innovations. This encompasses integrating knowledge, designing innovations, and developing experimental skills key 21st-century competencies. Addressing these needs aligns with national vocational education policies, which emphasize innovation, research, and the production of high-quality workforce competencies.

By promoting collaboration, resource allocation, and professional development opportunities, vocational teachers can enhance their capacity to foster innovation effectively.

Development of Innovation Competency Using Professional Learning Communities (PLC)

The development of innovation competency for vocational teachers through professional learning communities using participatory action research across two cycles revealed successful outcomes according to the set criteria. The four components and 14 specific goals were met, with an overall average rating of very good. In the first research cycle, 9 goals were successfully achieved, and 5 were not.

Creative Thinking: This component included 4 goals, with 2 achieved and 2 not. The areas of success were "teachers thinking outside the box to create work" and "teachers initiating useful new ideas."

Applying Knowledge for Innovation Development: This included 3 goals, with 1 achieved and 2 not. Successful progress was made in "teachers designing innovations."

Constructive Confidence: This component was fully achieved, with all 3 goals met.

Effective Communication: This component included 4 goals, with 3 achieved and 1 not. The unsuccessful goal was "teachers communicating effectively."

The lack of success in certain goals, such as "thinking outside the box" and "initiating new ideas," was attributed to teachers' concerns about making mistakes or being rejected for their new ideas. Creative

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thinking development requires learning from failure and creating a safe space where trying new things is not judged.

Other unsuccessful goals, such as designing innovations, experimenting with innovations, and effective communication, are related to knowledge and skills. These may have been hindered by a lack of basic innovation design knowledge (e.g., SCAMPER, Design Thinking, ADDIE Model), or by teachers' fear of criticism, making them hesitant to try new methods or share ideas confidently.

The development process demonstrated that vocational teachers' innovation competency evolves through both work-related and personal development. By integrating learning from actual practice, as well as developing through external training and self-improvement, teachers gain the knowledge and skills necessary to enhance innovation, ultimately benefiting the educational institution.

This aligns with the concept that teachers should receive continuous professional development through on-the-job training, off-the-job development, and self-development to meet both personal and institutional needs.

Evaluation of Outcomes

Individual-level Changes: Both administrators (researcher) and teachers involved in the research experienced learning through practice (Learning by Doing) throughout the research process. The administrator learned about participatory action research processes and the use of professional learning communities (PLCs), incorporating five key components: Shared Vision, Collaborative Teamwork, Shared Leadership, Caring Community, and Supportive Structure. Teachers gained continuous knowledge exchange regarding innovation and creativity, enhancing their critical thinking, motivation for self-development, and confidence in innovation creation. These changes were driven by the faculty's commitment to improving their teaching and the context of the vocational institution's challenges in national-level innovation competitions. Teachers' backgrounds in industrial engineering or related fields also played a role in these changes.

Group-level Changes: At the group level, a culture of collaborative work and systematic knowledge exchange emerged. Teachers worked together to analyze problems and develop creative solutions. This process, rooted in the PLC approach, strengthened the group's ability to collaborate efficiently, resulting in innovations benefiting students, the institution, and the community. These changes were influenced by participation in intensive workshops designed to foster collaboration, such as brainstorming and mini projects.

Institution-level Changes: At the institutional level, Phon Thong Vocational College fostered a knowledge management approach focused on innovation competency development. The institution embraced a culture of learning by doing and used PLCs to improve the quality of teaching and elevate vocational education standards. The leadership style emphasized inclusive leadership, promoting collaboration and creative thinking, which prepared the institution for future innovation development.

Evaluation of Product Innovations: Teachers created product innovations that benefited the community, including a medical service robot, calcium-enriched vegetable powder, and dragon fruit peel lip balm. These innovations were evaluated using a qualitative scoring rubric, with all three products receiving high ratings. This success was due to the comprehensive development process, including theoretical study and expert validation, as well as the supportive and collaborative nature of the PLC process, which allowed teachers to reach their innovation goals.

Discussion and Recommendations

The findings demonstrate that PLCs are an effective strategy for fostering innovation competency in vocational teachers. The collaborative nature of PLCs encouraged peer learning and mutual support,

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addressing the identified gaps in professional development. This aligns with existing research advocating for PLCs as a vehicle for systemic educational reform.

Key contributions of this study include:

Providing a structured framework for integrating PLCs into vocational education.

Highlighting the importance of iterative cycles in professional development.

Establishing a validated set of innovation competency indicators tailored to vocational education contexts.

The study also identified challenges, such as varying levels of initial competency among participants and resistance to change, which were mitigated through continuous feedback and iterative improvements.

Practical Recommendations

Institutionalize PLC frameworks to sustain ongoing competency development.

Focus on building skills in knowledge application for innovation through targeted activities.

Strengthen industry partnerships to align educational outcomes with market demands.

Develop evaluation mechanisms to monitor long-term impacts of PLC initiatives.

Conclusion

This study underscores the transformative potential of PLCs in enhancing innovation competency among vocational teachers. By leveraging collaborative professional environments, vocational educators can develop the skills and confidence necessary to meet evolving industry demands. The PLC framework presented in this study offers a replicable model for other educational institutions aiming to align their outcomes with national and global innovation strategies. Future research should explore the long-term impact of PLCs and their scalability across diverse educational settings.

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