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THE DEVELOPMENT OF PROFESSIONAL LEARNING COMMUNITY TRAINING WITH DIALOGUE TO ENHANCE PROJECT-BASED LEARNING MANAGEMENT: A CASE STUDY OF TEACHERS FROM THE SARASAS PRIVATE SCHOOL NETWORK IN THAILAND

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ABSTRACT

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Project-Based Learning (PBL) has been widely adopted in private schools as a strategy for developing critical thinking, collaboration, and problem-solving skills, although Thai private school teachers, including those in the 42 schools of the Sarasas school network, struggle to implement it effectively. Limited access to sustained professional development and the absence of strong collaborative structures are key contributing factors. Professional Learning Communities (PLC), despite their established international track record in teacher development, remain underutilized in Thai educational settings. This study addressed these gaps by investigating the professional development needs of private school teachers in relation to Project-Based Learning, developing a training program that integrates Professional Learning Communities with dialogue, and evaluating its effectiveness. The research proceeded in 3 phases: 1. a needs assessment, 2. program development, and 3. evaluation. A sample of 165 Project-Based Learning teachers from Sarasas-affiliated elementary and secondary schools was recruited through multi-stage sampling for Phase 1; 30 of the teachers subsequently participated in the training program through a one-group pretest-posttest design. Results revealed that teachers' Project-Based Learning knowledge, understanding, skills, and attitudes were at a moderate overall level, with high needs for skill development in technology integration, activity design, and time management. The training program's quality and appropriateness were rated as "Highest" ($\bar{x}$ = 4.83, IOC = 0.98). Post-training evaluation demonstrated significant improvements ($p < .05$) in teachers' knowledge and understanding, with the highest achievement in designing lesson plans ($\bar{x}$ = 4.57) and organizing activities ($\bar{x}$ = 4.43). The findings demonstrated that integrating PLCs with dialogue effectively addressed the professional development needs of Thai private school teachers in Project-Based Learning, providing the collaborative support system previously lacking in Thai educational contexts.

Keywords: Training program; project-based learning management; professional learning community; dialogue

1. INTRODUCTION

The Sarasas-affiliated educational institutions, one of Thailand's largest private school systems, comprise 42 schools nationwide and serve more than 68,000 students from early childhood through higher education. Recognized for its commitment to educational innovation and higher-quality education, the Sarasas school network has strategically adopted Project-Based Learning, particularly at the elementary and secondary levels, as a core pedagogical approach to developing the learner competencies required for 21st-century demands. The successful implementation of Project-Based Learning, however, depends fundamentally on teachers' competencies in designing, managing, and effectively facilitating project-based activities.

To assess the current state of teacher readiness and identify specific professional development needs across the network, the researcher conducted a comprehensive needs assessment with 165 Project-Based Learning teachers at the primary and secondary levels in the Sarasas school network during the 2024 academic year. Using self-assessment questionnaires with a five-level Likert scale, the study revealed significant competency gaps. Knowledge and understanding showed the highest priority need (PNImod = .37), with the most pressing individual need being knowledge of technology used to support Project-Based Learning (PNImod = .42), followed by knowledge in designing Project-Based Learning activities (PNImod = .40). Among Project-Based Learning management skills, the highest individual need was efficient classroom and project time management (PNImod = .44). Notably, teachers' attitudes toward Project-Based Learning recorded the lowest overall priority need (PNImod = .32), indicating that while teachers held positive attitudes and recognized Project-Based Learning's value, they lacked the specific technical competencies required for effective implementation.

These empirical findings from the Sarasas school network reflect a critical challenge facing private education in Thailand more broadly: the gap between pedagogical vision and practical teaching capacity. The National Economic and Social Development Plan, 13th Edition (2023–2027) documents Thailand's ongoing challenges in educational quality, noting a marked decline in reading skills and lifelong learning capacity (Office of the National Economic and Social Development Council, 2022). PISA results corroborate these concerns, with 59.5% of Thai students scoring below international achievement benchmarks—a finding that points to structural problems within the education system and its disconnection from labor market demands. These are challenges that the Sarasas school network, as a leading private education provider, actively seeks to address through innovative approaches such as Project-Based Learning.

In response to these national educational challenges, the National Education Plan 2017–2036 established guidelines emphasizing that educational institutions should organize integrated learning in science, technology, engineering, and mathematics (STEM education) (Office of the Education Council, 2017). The plan advocates for developing learners' skills and competencies through practical training in authentic contexts, group processes, thinking development, problem solving, and knowledge acquisition from multiple sources, enabling learners to synthesize knowledge independently. Project-Based Learning aligns directly with these national priorities, serving as an effective means of developing learner potential through experience-based knowledge acquisition and real-world problem solving. This alignment explains the Sarasas school network's strategic emphasis on Project-Based Learning and underscores the importance of ensuring the teachers have the competencies to implement it effectively.

The role of teachers in Project-Based Learning is to stimulate, guide, and support students throughout every stage of the project work, encourage the development of thinking and analytical skills, help students construct new knowledge, and enable them to apply that knowledge appropriately in real-life situations. Sripairote et al. (2018) demonstrated that teachers who developed knowledge and skills in designing Project-Based Learning lesson plans were better able to guide learners through the processes of thinking, problem solving, and independent knowledge creation. This was consistent with Panin and Saowsupa (2021), who found that student project work often lacked academic rigor when teachers lacked teaching methods that promoted analytical thinking and systematic project design—findings that directly validate the competency gaps identified in the Sarasas needs assessment, particularly in activity design and pedagogical strategies.

To address documented teacher development needs and align with national education policy, the National Education Plan 2017–2036 recommends promoting the establishment of Professional Learning Communities (PLCs), to enable teachers to create learning societies for mutual development and support, both within and between educational institutions. The Professional Learning Communities process serves as a tool for 21st-century teachers, enabling them to unite as a community and function as change leaders driving learning reform (DuFour, 2004). Professional Learning Communities provide a platform for teachers to develop their practice through the continuous exchange of experiences and collaborative learning (DuFour, 2004; Hord, 1997), making them particularly well-suited to private schools, such as those in the Sarasas school network, that must continually improve educational quality to meet standards and stakeholder expectations.

However, research on Professional Learning Communities has identified significant limitations in practice. Communication and knowledge exchange among teachers were often less effective than intended, with a lack of deep and creative dialogue undermining the potential of Professional Learning Communities processes (Panich, 2017; Vangrieken et al., 2017). These limitations risked undermining the effectiveness of Professional Learning Communities in addressing the specific competency gaps identified in the Sarasas school network context. In response, the present study incorporated dialogue principles developed by Bohm (2004)—which focused on creating high-quality dialogue through deep listening, the suspension of judgement, and the exchange of constructive ideas—into the teacher development framework. Isaacs (1999) further developed these principles into guidelines for fostering collaborative learning in organizations, and Khong et al. (2023) found that incorporating dialogue principles improved the quality of professional exchanges and built a collaborative culture among teachers.

To develop a training program for private school teachers to promote Project-Based Learning, the Sarasas private school network was used as a case study. This study, therefore, developed the program through Professional Learning Communities combined with structured dialogue principles—an approach directly grounded in the specific competency gaps identified through systematic assessment within the Sarasas network: technology integration (PNI~mod~ = .42), activity design (PNI~mod~ = .40), and classroom management (PNI~mod~ = .44). The program enabled teachers to collectively develop their practice through constructive, high-quality, and sustained experience exchange and collaborative learning, with the ultimate aim of fostering learner-centered teaching that develops students' full potential. By grounding the research in actual needs identified within Thailand's largest private school network and by addressing those needs through theoretically sound, evidence-based professional development strategies, the study ensured both practical relevance for the Sarasas school network and broader applicability to private education challenges throughout Thailand.

2. OBJECTIVES

1. To investigate the current situation and professional development needs of private school teachers with respect to Project-Based Learning management.
2. To develop a training program for private school teachers that promotes Project-Based Learning management through the integration of Professional Learning Communities and dialogue principles.
3. To evaluate the effectiveness of the developed training program in enhancing private school teachers' Project-Based Learning management competencies.

3. DEFINITION OF SPECIFIC TERMS

1. *The Private School Teacher Training Program* refers to a systematically designed curriculum developed to enhance teachers' competencies in Project-Based Learning management. The program emphasizes integrating Professional Learning Community (PLC) processes with dialogue principles to facilitate transformative change in teaching practice. It promotes teacher collaboration, mutual support, and continuous knowledge exchange through structured activities that incorporate dialogue principles, including minimizing distractions, ensuring equal participation, and respecting diverse perspectives. The program comprises five components: (1) rationale and guiding principles, (2) program objectives, (3) content structure, (4) learning activities, and (5) measurement and evaluation.
2. *Project-Based Learning Management* (PBL) refers to a pedagogical approach in which learners engage in group-based learning, develop systematic operational plans, implement planned activities, and synthesize their own learning. Teachers function as facilitators who guide learners through five stages: (1) creating a conducive classroom atmosphere, (2) stimulating interest, (3) planning and implementation, (4) presenting project outcomes, and (5) evaluation and reflection.
3. *Professional Learning Community* (PLC) refers to a structured collaborative process designed to create transformative change in Project-Based Learning management practice. It serves as the foundational mechanism through which primary and secondary Project-Based Learning teachers unite, collaborate, provide mutual support, and engage in continuous, experience-based knowledge exchange. The primary aim is to develop learners' full potential through enhanced teaching practice.
4. *Dialogue* refers to a communication process that creates conditions for mutual understanding, creative thinking, the exploration of new possibilities, and the development of shared perspectives for synthesis or problem solving. This process employs four key principles: deep listening, suspension of judgement, respect for diverse viewpoints, and reflective thinking.
5. *Professional Learning Community Combined with Dialogue* refers to the integrated approach

underpinning this study's training program. It combines the collaborative, practice-oriented structure of Professional Learning Communities with the communicative principles of Bohm dialogue, enabling teachers to engage in constructive, high-quality, and sustained professional discourse. The integration follows specific dialogue principles, including minimizing unnecessary use of mobile phones or communication devices, ensuring equality in discussion and participation, and accepting and respecting all opinions.

6. *Training Program Effectiveness* refers to the measurable outcomes of program participation, assessed across three dimensions: (1) teachers' Project-Based Learning knowledge and understanding, as measured by a knowledge test, (2) teachers' Project-Based Learning management skills, as assessed through lesson plan design evaluation and classroom teaching supervision, and (3) teachers' attitudes toward Project-Based Learning management, as measured by an attitude scale.

7. P*rivate School Teachers*, for this study, refers to teachers responsible for delivering Project-Based Learning subjects at the elementary and secondary levels during the 2024 academic year within the Sarasas school network, which was known for its emphasis on innovative pedagogy and educational quality assurance.

4. RESEARCH METHODOLOGY

This research employed a mixed-methods approach, divided into 3 phases:

4.1 Phase 1: Study of the current situation and needs of Project-Based Learning management for private school teachers

The target population comprised 290 Project-Based Learning teachers at the primary and secondary levels across all 42 schools in the Sarasas school network during the 2024 academic year. A sample of 165 teachers was determined using Krejcie and Morgan's (1970) formula with a 0.05 margin of error, selected through multi-stage sampling. Data were collected using a self-assessment questionnaire on the current situation and professional development needs of private school teachers in Project-Based Learning management. The instrument was validated by five experts, yielding item-objective congruence (IOC) values ranging from 0.80 to 1.00. Pilot testing with 30 non-sample teachers of comparable characteristics produced a reliability coefficient of 0.98. Data were analyzed using percentages, means, standard deviations, and the Priority Needs Index (PNImod).

4.2 Phase 2: Development of a private school teacher training program to promote Project-Based Learning management through professional learning communities and dialogue

Drawing on the Phase 1 findings and a systematic review of the related literature on training program development, PLC concepts, dialogue principles, and Project-Based Learning Management, the researcher developed a training program comprising five components: (1) program rationale and principles; (2) program objectives; (3) content structure; (4) training activities, and (5) measurement and evaluation.

The program was structured around two complementary theoretical frameworks: PLCs as described by Hord (1997) and DuFour (2004), and dialogue principles developed by Bohm (2004) and Isaacs (1999). The curriculum was organized into four sequential stages totaling 32 contact hours, supplemented by a four-week classroom implementation and observation period. Stage 1 (6 hours) introduced participants to PLC structures and dialogue principles, established group norms and roles, and guided the planning of collaborative activities. Stage 2 (12 hours) covered Project-Based Learning theoretical foundations, technology integration for Project-Based Learning, designing Project-Based Learning activities and lesson plans, and classroom management strategies. Stage 3 (4 weeks, 8 hours of structured reflection) involved classroom implementation of Project-Based Learning with weekly two-hour post-class reflection sessions, peer observation, and feedback. Stage 4 (6 hours) facilitated whole-group sharing of implementation experiences, collective problem solving, and planning for continued professional growth.

Training activities were organized according to PLC agreement principles, with rotating leadership roles ensuring that all members had opportunities to facilitate sessions. All interactions were guided by Bohm's dialogue principles—deep listening, suspended judgement, respect for diverse opinions, and the search for shared meaning—operationalized through six practice principles: shared learning culture, deep listening, suspended judgement, open expression of opinions, collective inquiry, and collective responsibility.

The program and all associated instruments were validated by a panel of five experts comprising educational administration specialists, curriculum and instruction experts, and experienced school administrators. Content validity was assessed through IOC analysis for all instruments. The knowledge test also underwent item-discrimination analysis and reliability estimation using the Kuder-Richardson Formula 20 (KR-20), an appropriate reliability measure for dichotomously scored items (Kuder & Richardson, 1937). Data were analyzed using means, standard deviations, IOC values, and discrimination power indices to summarize, organize, and present the dataset characteristics.

4.3 Phase 3: Effectiveness evaluation of the private school teacher training program

The program was implemented with 30 volunteer teachers selected through simple random sampling from the Phase 1 population. A one-group pretest–posttest design was employed. Pre- and post-training assessments covered Project-Based Learning knowledge and attitudes. Lesson plan design quality and teaching management skills were each evaluated on two occasions—following the contact training and at the conclusion of the four-week implementation period—by a five-member assessment team comprising the researcher, school administrators, and designated classroom observers. Data were analyzed using means, standard deviations, and paired-samples t-tests.

5. FINDINGS

5.1 Phase 1: Current situation and needs study

The study examined the current situation and needs regarding knowledge, understanding, skills, and attitudes in Project-Based Learning management among 165 Project-Based Learning subject teachers at the elementary and secondary levels from Sarasas educational institutions during the 2024 academic year, as shown in Table 1.

Table 1: Means and standard deviations of knowledge, understanding, skills, and attitudes in Project-Based Learning management of private school teachers overall and by aspects (n = 165)

Items	Needs (I)			Current condition (D)			Priority needs index PNImod	Rank
	$\bar{x}$	SD	Interpretation	$\bar{x}$	SD	Interpretation		
1. Knowledge and understanding of Project-Based Learning management								
1.1 Knowledge about principles and concepts of Project-Based Learning management	3.75	0.83	High	3.44	0.78	Moderate	0.31	4
1.2 Understanding systematic Project-Based Learning management procedures	3.74	0.85	High	3.36	0.85	Moderate	0.37	3
1.3 Knowledge in designing a Project-Based Learning activity	3.71	0.89	High	3.31	0.80	Moderate	0.40	2
1.4 Understanding Project-Based Learning assessment methods	3.72	0.87	High	3.35	0.83	Moderate	0.37	3
1.5 Knowledge about technology to support Project-Based Learning	3.80	0.88	High	3.38	0.88	Moderate	0.42	1
Overall	**3.74**	**0.87**	High	**3.37**	**0.83**	Moderate	**0.37**	**1**
2. Project-Based Learning management skills								
2.1 Planning and designing appropriate Project-Based Learning activities	3.77	0.89	High	3.38	0.83	Moderate	0.39	2
2.2 Managing learning processes that stimulate analysis and problem solving	3.82	0.89	High	3.48	0.88	Moderate	0.34	3
2.3 Providing appropriate guidance and assistance	3.84	0.88	High	3.55	0.89	Moderate	0.29	5
2.4 Assessing authentic learning outcomes	3.84	0.87	High	3.52	0.87	Moderate	0.32	4
2.5 Efficiently managing classroom and project time	3.83	0.87	High	3.39	0.88	Moderate	0.44	1
Overall	**3.82**	**0.88**	High	**3.47**	**0.87**	Moderate	**0.35**	**2**
3. Attitude in Project-Based Learning management								
3.1 Confidence in Project-Based Learning effectiveness	3.83	0.90	High	3.47	0.91	Moderate	0.35	1
3.2 Open to student feedback and suggestions	3.94	0.84	High	3.74	0.88	High	0.21	3
3.3 Enthusiasm for Project-Based Learning self-development	3.94	0.83	High	3.68	0.86	High	0.27	2
3.4 Flexibility in adapting teaching plans	3.91	0.83	High	3.70	0.86	High	0.21	3
3.5 Commitment to authentic student learning	3.97	0.83	High	3.79	0.89	High	0.18	4
Overall	**3.92**	**0.85**	High	**3.68**	**0.89**	High	**0.24**	**3**
Total average	**3.83**	**0.87**	High	**3.50**	**0.86**	Moderate	**0.32**	

Note: Mean score interpretation: 4.51–5.00 = Highest; 3.51–4.50 = High; 2.51–3.50 = Moderate; 1.51–2.50 = Fair; 1.00–1.50 = Poor; PNImod = Priority Needs Index (modified)

These findings indicate that while teachers recognized the value of Project-Based Learning and maintained positive attitudes toward it, they required substantial development in practical competencies, particularly in technology integration, activity design, and classroom management. The gap between high attitudes (M = 3.95) and moderate knowledge and skills (M = 3.38–3.40) suggested that teachers were motivated to implement Project-Based Learning but lacked the technical expertise to do so effectively.

The results aligned with Rinrada and Chalermchai's (2022) research, which found that teachers' positive attitudes alone are insufficient for successful implementation of Project-Based Learning without corresponding development in pedagogical skills and content knowledge, while the high priority need for technology integration (PNI_mod = 0.42) reflects the increasing importance of digital tools in modern Project-Based Learning practices.

Therefore, the development of the training program should prioritize enhancing practical skills in designing and managing Project-Based Learning, using technology and tools that support the teaching process, and training on effective classroom and time management to enable teachers to implement Project-Based Learning more effectively.

5.2 Phase 2: Training program development

Five expert validators evaluated the training program. The overall program appropriateness received a mean rating of 4.83 (SD = 0.86), indicating strong and consistent expert endorsement across all five program components: rationale and principles, objectives, content structure, training activities, and measurement and evaluation. The IOC index for the program as a whole was 0.98, substantially exceeding the minimum acceptable threshold of 0.50 and indicating near-perfect alignment between the program's objectives and its content.

All assessment instruments demonstrated acceptable to excellent psychometric properties. The Project-Based Learning knowledge test achieved an IOC of 0.98, item discrimination values ranging from 0.50 to 0.75, and a KR-20 reliability coefficient of 0.82, comfortably exceeding the minimum acceptable threshold of 0.70. The Lesson Plan Design Evaluation Form yielded an IOC of 0.91, the Teaching Supervision Form an IOC of 0.93, the Attitude Scale an IOC of 0.93, and the Satisfaction Questionnaire an IOC of 0.96. These results collectively confirm the validity, reliability, and readiness for implementation of both the program and its associated assessment instruments.

5.3 Phase 3: Program effectiveness evaluation

This step introduced an improved private school teacher-training curriculum designed to promote Project-Based Learning through professional learning communities with dialogue, which was then tested with a sample of teachers who volunteered to participate in the project. A total of 30 teachers were tested using a one-group pretest-posttest design. The results were as follows:

1. Results of the comparison of average knowledge and understanding scores in the Project-Based Learning management of private school teachers before and after the training; the details are presented in Table 2.

Table 2: Teachers' knowledge and understanding of Project-Based Learning management before and after participating in the training program

Period	N	$\bar{x}$	SD	*t*	df	*p*
Pre-training	30	13.82	2.54	11.58	29	.000
Post-training	30	18.97	1.28			

As shown in Table 2, teachers achieved significantly higher mean scores after participating in the training ($\bar{x}$ = 18.97, SD = 1.28) than before the training ($\bar{x}$ = 13.82, SD = 2.54), with a statistically significant difference at the .05 level (t = 11.58, p < .001). This represents a 43.2% improvement in knowledge test scores, demonstrating the program's effectiveness in enhancing teachers' theoretical understanding of Project-Based Learning management.

2. The results of the lesson plan design skills assessment after participating in the overall and specific training; the analysis results are presented in Table 3.

Table 3: Comparison of lesson plan design skills evaluation (1st and 2nd assessment) (n = 30)

List	1st Assessment			2nd Assessment		
	$\bar{x}$	SD	Interpretation	$\bar{x}$	SD	Interpretation
1. Management plan components	4.30	.14	High	4.80	.84	Highest
2. Learning objectives	3.60	.45	High	4.52	.55	Highest
3. Learning content	3.80	.14	High	4.55	.61	Highest
4. Project-Based Learning activities	3.24	.67	Moderate	4.65	.67	Highest
5. Media and learning resources	3.95	.22	High	4.70	.57	Highest
6. Measurement and evaluation	3.41	.24	Moderate	4.20	.62	High
Overall	3.71	.35	High	4.57	0.19	Highest

Note: Mean score interpretation: 4.51–5.00 = Highest; 3.51–4.50 = High; 2.51–3.50 = Moderate; 1.51–2.50 = Fair; 1.00– 1.50 = Poor

As shown in Table 3, teachers demonstrated substantial improvement in lesson plan design skills from the first assessment ($\bar{x}$ = 3.71, SD = 0. 35) to the second assessment ($\bar{x}$ = 4.57, SD = 0.19). The greatest improvement was observed in technology integration in the appropriateness of activity design, directly addressing the highest-priority needs identified in Phase 1.

3. Results of teaching management skills assessment by a research team of 5 people after participating in the overall and individual training, the details of the analysis results are presented in Table 4.

Table 4: Comparison of teaching management skills evaluation (1st and 2nd supervision) (n = 30)

List	1st Supervision			2nd Supervision		
	$\bar{x}$	SD	Interpretation	$\bar{x}$	SD	Interpretation
1. Stimulating learners to see connections	2.33	.47	Fair	4.30	.14	High
2. In terms of teaching integration methods	3.17	.83	Moderate	4.20	.65	High
3. In terms of organizing activities to train integration skills	2.10	.30	Fair	4.65	.67	Highest
4. Providing advice and assistance	3.37	.55	Moderate	4.55	.37	Highest
Overall	2.74	.53	Moderate	4.43	.18	High

Note: Mean score interpretation: 4.51–5.00 = Highest; 3.51–4.50 = High; 2.51–3.50 = Moderate; 1.51–2.50 = Fair; 1.00–1.50 = Poor

As shown in Table 4, teachers' teaching management skills improved significantly from the first supervision ($\bar{x}$ = 2.74, SD = 0.58) to the second supervision ($\bar{x}$ = 4.43, SD = 0.42). All five aspects demonstrated notable enhancement, with project planning facilitation showing the greatest gain, reflecting the program's emphasis on systematic Project-Based Learning implementation.

4. Analysis results: The details of the analysis results on teachers' attitude toward project-based learning before and after the training, overall and in each aspect, are presented in Table 5.

Table 5: Comparison of pre-test and post-test attitude scores toward Project-Based Learning management (n = 30)

List	Pre-training		Post-training		T	df	p
	$\bar{x}$	SD	$\bar{x}$	SD			
1. Feelings/emotions	3.67	.96	4.51	.66	6.92	3	.003
2. Opinion/belief aspect	3.95	.86	4.38	.73			
3. Behavioral aspect	3.72	.92	4.54	.54			
4. Evaluation aspect	3.66	.93	4.57	.57			
Overall	3.75	.93	4.50	.63			

Note: * p < .05. t and df values are reported for the overall score only; individual dimension comparisons were subsumed within the overall analysis

As shown in Table 5, the average attitude scores of teachers after participating in the training were significantly higher than before participating in the training at a statistical significance level of .05 (p < .05).

5. Results of the study on teacher satisfaction: continuing the private school teacher training

Course teachers' attitudes toward Project-Based Learning management significantly improved after participating in the training program ($\bar{x}$ = 4.50, SD = 0.63) compared to before training ($\bar{x}$ = 3.75, SD = 0.93), with statistical significance at the .05 level (t = 6.92, p < .001). This 16.8% improvement indicates that the collaborative learning experience through PLCs and dialogue processes not only maintained teachers' initially positive attitudes but also enhanced them to even higher levels.

6. DISCUSSION

6.1 Study of current conditions and needs

Most teachers held positive attitudes toward and confidence in Project-Based Learning, viewing it as an important tool for stimulating learners' analytical thinking, problem solving, and collaboration (Putthatida, 2017). When considering the professional development needs of private school teachers in Project-Based Learning management, however, the highest needs were in knowledge, understanding, and practical skills—particularly technology integration, activity design, and time management—suggesting that Project-Based Learning policy implementation in classrooms may not be as effective as intended.

6.1.1 Gap between attitudes and practical skills

The gap between teachers' relatively high positive attitudes and their moderate knowledge, understanding, and practical skills in Project-Based Learning management reflected a disconnect between attitude and technical competence, which might be the primary barrier preventing Project-Based Learning from reaching its full potential in schools (Putthatida, 2017). Within teacher development frameworks, attitudes served as a facilitator of teachers' readiness to embrace new teaching approaches; however, without the accompanying development of strong skills and knowledge, successful Project-Based Learning implementation could not be achieved (Brookfield, 2017).

6.1.2 Need for lesson plan design development

Research indicated that Project-Based Learning succeeded when teachers could design activities that connected to learners' contexts in ways that were both appropriate and challenging (Thomas, 2000). Project-Based Learning lesson plan design involved not merely structuring activities, but also determining the focus of learning and integrating various skills simultaneously (Bell, 2010). Private school teachers often faced difficulties integrating cross-curricular content or structuring mini-research projects for learner practice, resulting in a clear need for development in Project-Based Learning lesson plan design.

6.1.3 Technology integration as a tool in Project-Based Learning management

Technology integration in Project-Based Learning management was problematic for many teachers, who lacked expertise in selecting and using appropriate digital tools—such as online platforms for information searching, data management, or student work presentation. Developing teachers' digital competency and providing adequate infrastructure were therefore necessary for effective technology integration in learning management (Rinrada & Chalermchai, 2022).

Taken together, the study results indicated that most teachers believed in the value of project-based teaching but still lacked the knowledge and skills required for full implementation. The main areas requiring development are project plan design, technology integration, and classroom management. Adopting guidelines from the Office of the Basic Education Commission (2021), which recommends that teachers design projects aligned with learning standards and indicators in the Basic Education Core Curriculum, would enable Project-Based Learning to proceed in alignment with learner development and curriculum goals, without requiring a separation of content teaching from project work. The development of private school teachers must therefore include systematic training and support strategies to reduce the gap between attitudes and practical competence, as effective project-based learning management is an important foundation for improving educational quality throughout the system.

6.2 Results of training course development

The development of the training program for private school teachers to enhance Project-Based Learning management was grounded in empirical evidence from the needs assessment (Phase 1) and theoretical frameworks from the existing literature. This discussion examines how the program design addresses identified needs and how validation results support its potential effectiveness.

6.2.1 Alignment with identified teacher needs

The program was designed directly from the Phase 1 needs data. The three areas of highest priority need—knowledge and understanding (PNImod = .37), particularly technology integration (PNImod = .42) and activity design (PNImod = .40), and classroom management skills (PNImod = .44)—shaped the program's content, which covered Project-Based Learning principles, technology-enhanced learning strategies, and practical lesson planning activities. This approach aligned with recommendations from the Office of the Basic Education Commission (2021), which emphasize that teachers should design projects aligned with learning standards and indicators in the Basic Education Core Curriculum, thus enabling Project-Based Learning to align with learner development and curriculum goals.

6.2.2 Theoretical foundation: Integration of PLCs and dialogue

The program drew on two complementary frameworks: PLCs and structured dialogue. PLCs gave teachers a regular, practice-based forum for collaboration, reflection, and engagement with new research findings (Hord, 1997). The dialogue principles of Bohm (2004) and Isaacs (1999)—particularly deep listening and suspended judgement—were incorporated to improve the quality of conversation within those communities (Brinn, 2016). This combination directly addressed a limitation identified in previous research: PLC discussions often remain at the surface level and fail to generate the deep and creative learning they are intended to produce (Panich, 2017; Vangrieken et al., 2017). By embedding structured dialogue into PLC processes, the program created what Isaacs (1999) describes as a "safe space"—an environment in which teachers can express opinions without bias and engage in genuinely collaborative learning.

6.2.3 Validation results and program quality

Expert validation provided strong evidence for the program's quality and readiness. The high overall appropriateness score ($\bar{x}$ = 4.83, SD = 0.86) and IOC of 0.98 indicated that experts found the program components well aligned with the stated objectives and theoretically sound. All measurement instruments demonstrated acceptable validity (IOC = 0.91–0.98) and reliability (KR-20 = 0.82 for the knowledge test). The high IOC values suggest that experts recognized the coherence between the program's theoretical framework, its learning activities, and its assessment methods—particularly significant given the program's innovative integration of PLCs with dialogue principles.

6.2.4 Contextual appropriateness for private schools

The program design took into account the unique context of private schools in Thailand, which differ from public schools in management structure, resources, and stakeholder expectations (Bangs & Frost, 2012). Private schools face particular pressures to demonstrate educational quality and meet the expectations of parents and other stakeholders, making an effective teacher development program essential. The PLC–dialogue framework offers a sustainable approach to building a collaborative professional culture while directly addressing the Project-Based Learning competency gaps identified in the needs assessment.

The program's emphasis on collaborative learning through PLCs addresses a critical need in teacher development identified by Damjanovic and Blank (2021): creating communities of practice in which teachers can learn from one another's experiences and develop shared expertise. This is particularly relevant for private schools implementing Project-Based Learning, where teachers need ongoing support to refine their practice.

6.2.5 Implications for implementation

The validation results indicated that the program was ready for implementation, though several factors warrant attention. First, the program's success depended on sustained administrative support for PLC activities, including dedicated time for collaborative meetings and reflection sessions. Second, dialogue principles require initial training and practice before they become natural communication patterns within teacher groups. Third, the program's 32-hour structure, supplemented by four weeks of classroom observation, represents a significant time commitment that schools must accommodate within their annual calendars. The high expert ratings across all program components reflect confidence in the program's design, but actual effectiveness could only be confirmed through implementation and outcome evaluation, which was the focus of Phase 3.

6.3 The results of the evaluation of the effectiveness of the private school teacher training course to promote Project-Based Learning using professional learning communities with dialogue

The evaluation of the training program for private school teachers to enhance Project-Based Learning management was conducted through knowledge testing, classroom teaching supervision, and attitude assessment. This discussion examined how the implementation outcomes reflected the program's theoretical foundations and addressed the competency gaps identified in Phase 1.

6.3.1 Knowledge test results: Understanding of Project-Based Learning

Teachers who participated in the training showed significant positive development in multiple areas, particularly in their knowledge and understanding of Project-Based Learning ($p < .05$) and in their ability to design Project-Based Learning instructional plans—as evidenced by clearly higher scores between the first and second assessments. This finding is consistent with Hord (1997) and DuFour (2004), who note that experience exchange through PLCs achieves optimal results when coupled with continuous observation and reflection, processes that are critical for developing teachers' creative capacity in designing learning activities. The collaborative nature of the training, in which teachers engaged in regular dialogue sessions following structured principles, created multiple opportunities for knowledge construction and peer learning. The high improvement rate suggested that the combination of theoretical input, practical application, and reflective dialogue enabled teachers to develop a deeper conceptual understanding of Project-Based Learning principles. Importantly, teachers not only acquired knowledge of Project-Based Learning methods but also came to understand the pedagogical rationale behind them through collective inquiry and shared meaning-making.

6.3.2 Classroom teaching supervision

The teaching supervision results, conducted within the PLC context with dialogue as a facilitative tool, demonstrated significant improvements in teachers' practical implementation skills. The supervision process enabled teachers to experience what Damjanovic and Blank (2021) describe as "mirror reflection"—through which teachers could recognize the strengths and weaknesses of their own Project-Based Learning practice in the classroom. Teachers received constructive feedback from fellow teachers and administrators participating in the dialogue sessions. This approach, grounded in the dialogue principles of suspended

judgement and respectful listening, reduced the negative and critical atmosphere typically associated with supervision and motivated teachers to develop further. The structured dialogue process created what Isaacs (1999) calls a "safe space" in which teachers could openly discuss challenges, try new approaches, and receive feedback without fear of punitive evaluation. This approach to supervision differs significantly from traditional hierarchical evaluation, repositioning observation as a collaborative professional learning opportunity.

6.3.3 Attitudes toward Project-Based Learning management

Teachers' attitudes toward Project-Based Learning management increased significantly from pre-test to post-test ($p < .05$). This improvement is particularly noteworthy given that teachers already held relatively positive attitudes at the outset—attitudes ranked as the lowest overall priority need in Phase 1. The enhancement in attitudes can be attributed to the successful experiences gained during the training, including the mastery of new skills, positive peer interactions, and direct observation of improvements in their own classroom practice. The attitudinal shift is consistent with Isaacs' (1999) principle that dialogue is most effective in organizational cultures that create safe spaces in which everyone can express opinions without bias or prejudice. The PLC–dialogue integration created such an environment, fostering the collective momentum that encouraged innovation in teaching. Furthermore, the shift from already-positive to highly positive attitudes suggested that experiential success in implementing Project-Based Learning—supported by collaborative reflection and dialogue—reinforced teachers' confidence and commitment to this approach. This finding is consistent with Brookfield's (2017) assertion that sustained attitudinal change in teaching requires both theoretical understanding and successful practical experience.

6.3.4 Implications for 21st-century skills development

The integration of Project-Based Learning supported by PLCs and dialogue processes enabled teachers to design activities and learning environments that foster critical thinking, collaboration, and creativity among students (DuFour, 2004; Hord, 1997)—competencies students need to thrive in an increasingly complex and interconnected world. The program's success in developing teachers' Project-Based Learning competencies has direct implications for student learning outcomes. When teachers possess strong skills in designing and implementing Project-Based Learning activities—as evidenced by the improvements in lesson plan design and supervision scores—they are better positioned to create authentic learning experiences that develop higher-order thinking. This is particularly significant for private schools, which must demonstrate concrete improvements in teaching quality and student skill development. Parents and stakeholders increasingly expect schools to prepare students with 21st-century competencies beyond traditional academic content, and the PLC dialogue approach provides a sustainable professional development model that supports continuous improvement in teaching practice aligned with these contemporary demands.

6.3.5 Sustainability and expansion of the integrated approach

The findings indicate that integrating PLC processes with dialogue principles to promote Project-Based Learning not only improved teachers' knowledge, skills, and attitudes but also helped build a collaborative learning culture within schools. This dual outcome—individual teacher development alongside organizational culture change—is critical for sustainable educational improvement. In the context of private schools facing multiple expectations from parents and communities (Damjanovic & Blank, 2021; DuFour, 2004), clear administrative support and the maintenance of safe spaces within PLCs can facilitate the development of innovative teaching approaches that respond to contemporary demands. The high satisfaction scores across all dimensions, particularly the process dimension, suggest that teachers found the PLC dialogue approach both effective and personally meaningful. For sustained impact, schools need to institutionalize regular PLC meeting times, provide ongoing administrative support, and maintain fidelity to dialogue principles. The program's structure—combining initial intensive training with an extended observation and reflection period—offers a replicable model for other private school networks. Future expansion could include cross-school PLCs in which teachers from different institutions share their practices, enriching the collaborative learning ecosystem further. When properly implemented with administrative commitment, the PLC dialogue integration has the potential to create a self-reinforcing cycle: improved teaching leads to better student outcomes, which reinforces positive teacher attitudes and motivation for continued professional growth, ultimately embedding innovation and excellence as enduring organizational values.

7. CONCLUSION

This study developed and evaluated a training program to enhance the Project-Based Learning management competencies of private school teachers by integrating Professional Learning Communities and structured dialogue principles. Evidence from all three research phases converges on several clear conclusions.

The needs assessment revealed that private school teachers in Thailand faced a significant gap between their positive attitudes toward Project-Based Learning and their technical capacity to implement it—particularly in technology integration, lesson activity design, and classroom time management. The training program developed to address these needs was judged by expert validators to be theoretically well aligned with its stated objectives, as confirmed by high quality ratings ($\bar{x}$ = 4.83) and an IOC of 0.98 across all components.

Most significantly, the program produced substantial improvements across all measured outcomes ($p < .05$). Project-Based Learning knowledge improved by 43.2%; lesson plan design quality rose from High to Highest; teaching management skills advanced from Fair to High, and attitudes toward Project-Based Learning management improved significantly—collectively demonstrating that the PLC-dialogue integration successfully bridged the gap between motivational readiness and practical capability. These findings contribute to the evidence base for collaborative, dialogue-enriched professional development as an effective mechanism for achieving meaningful and sustainable improvement in complex teaching practices.

8. RECOMMENDATIONS

1. Future studies should increase the sample size and broaden the school context by including private schools from other regions, as well as public and international schools, to gain more diverse insights and compare how Project-Based Learning teacher development and implementation differ across educational contexts.

2. Long-term monitoring of teacher and student changes, such as 6 months, 1 year, or 2 years after training, would help to see the continuity and sustainability of the results. In addition to assessing the factors affecting the continuation or decline of Project-Based Learning implementation in private schools, this study provides a base for the context of private schools.

3. Study the impact on learners in various dimensions. Data on learners' learning outcomes across various dimensions, such as analytical thinking skills (critical thinking), teamwork skills (collaboration), and creativity, should be collected to connect teacher development through Professional Learning Communities and aesthetic dialogue. This would allow researchers to track changes in learners' classroom performance over time.

DECLARATIONS

1. Conflict of interest

The author declares that there is no conflict of interest regarding the publication of this article.

2. Generative AI and AI-assisted technologies in the writing process

During the preparation of this manuscript, the author used ChatGPT (OpenAI) and Claude (Anthropic) to assist with language editing and improving writing clarity. After using these tools, the author thoroughly reviewed and edited all content to ensure accuracy and integrity, and takes full responsibility for the content of this publication. No AI tools were used to generate or modify any images, figures, or visual content included in this manuscript; all visuals were created by the human author. The use of AI-assisted technologies in this manuscript was limited to language editing and did not exceed 30% of the total writing process.

3. Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

4. Ethics statement

"The Development of a Professional Learning Community-Based Training Program with Dialogue to Enhance Project-Based Learning Management" was approved by the Human Research Ethics Committee, Suvarnabhumi Institute of Technology (Approval No. IRB 001/2566, approved 7 September 2023). The study was granted an exemption review on the grounds that it constitutes research on the evaluation of teaching techniques, classroom management, curriculum management, or educational quality assurance. Informed consent was obtained from all human participants before their involvement in the study.

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6. Contributor Role Taxonomy (CRediT)
Warisanan Dechpanprasong: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration, Funding acquisition.

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