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The development of a research training curriculum for basic education teachers to enhance 21st-century student competencies

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Abstract

This study aimed to develop and evaluate a research training curriculum designed to enhance teachers' research-informed learning management competencies for developing students' 21st-century skills. Using a research and development design, the study was conducted in two phases: Phase 1 develops the curriculum design, while Phase 2 implements the curriculum. The instruments included Interview Protocol for Curriculum Development, Curriculum Quality Evaluation Form, a 30-item knowledge test, a teacher learning management competency assessment form, and a satisfaction questionnaire. Quantitative data were analyzed using mean scores, standard deviations, a paired-sample t-test, and a one group t-test. Qualitative data were analyzed using reflective journals and observations underwent thematic analysis. The findings revealed significant improvements in teachers' research knowledge and competencies, with high satisfaction ratings toward the curriculum. The study contributes a practical model for integrating research skills into teacher professional development to enhance instructional practices.

Keywords: Research skills, Teacher development, Training curriculum.

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1. Introduction

Education systems across the globe have been focusing on equipping learners with competencies that respond to the demands of the twenty-first century [1-3]. As can be seen from the framework, 21st Century Skills encompass student success in the new global economy, including core subjects, learning and innovation skills, data literacy, media and technology skills, as well as life and work skills [4]. Students in contemporary educational institutions will utilize their knowledge to comprehend and address real-world difficulties through the application of 21st-century abilities [5]. In Thailand, the Basic Education Development Plan 2023-2027 for students is defined as 3Rs and 8Cs, with 1) 3Rs as follows: Reading, (W)Riting and (A)Rithemetics 2) 8Cs as follows:2.1) Critical Thinking and Problem Solving, 2.2) Creativity and Innovation, 2.3) Cross-cultural Understanding, 2.4) Collaboration, Teamwork, and Leadership, 2.5) Communications, Information, and Media Literacy 2.6) Computing and ICT Literacy 2.7) Career and Learning Skills and 8) Compassion Office of the Basic Education Commission [6]. Sihawong and Phusee-orn [7] extend beyond foundational literacy and numeracy to include collaboration, creativity, communication, critical thinking, and the ethical use of information and technology. For students to acquire these competencies, teachers are also demanded to design and implement learning management approaches that go beyond traditional content delivery and actively develop higher-order skills and dispositions [8, 9].

However, establishing effective learning management needs both pedagogical expertise and the teacher's ability to conduct systematic inquiry into their own practice. This is to say research skills enable teachers to identify learning problems, design interventions, assess outcomes, and refine instructional strategies in ways that are contextually responsive and evidence-based [10-12]. In other words, without sufficient capacity in classroom-based research, teachers may struggle to create instructional environments that support the development of students' twenty-first century competencies [13]. In Thailand, as in many other contexts, professional development for teachers has often emphasized content knowledge and classroom techniques, but less attention has been directed toward strengthening teachers' research skills as a foundation for instructional improvement [14].

Teachers need to rethink their roles in managing learning. The activities are set up so that each student can check on their own progress in learning. To develop students' skills for success in the 21st century, they must conduct self-directed research to acquire knowledge [15]. In response to changes in the 21st century, the Thai education system has changed how students learn by focusing on building their abilities and encouraging them to always want to learn more. A new way of designing learning systems is changing what teachers do. Improving the framework for managing education and setting up a system for lifelong learning. Increasing understanding of Thailand's role, duties, and place in Southeast Asia and the world as a whole. Creating a system of digital platforms to help students learn and an educational framework for students to do well in school around the world [16]. This must help teachers learn other ways to teach. Organize exercises that are suitable for each age group and include obstacles and situations that come up in the classroom. Teachers have different ways of learning, so they need to use different ways to educate [17].

To demonstrate, in teacher schools, preservice teachers are only required to conduct a research project as a part of their graduation [18]. Moreover, research and publication are not a part of their preliminary promotion criteria in their career path [19]. Lack of research experience might hinder the development of these skills. Therefore, a training curriculum that systematically develops research skills can therefore serve as a powerful mechanism to enhance teachers' learning management and, in turn, promote students' competencies for lifelong learning and future employability.

The present study was designed to address this need. Its primary purpose was to develop and trial a research training curriculum tailored for basic education teachers, with the dual objectives of strengthening teachers' research skills for enhancing learning management and advancing students' twenty-first century competencies. The study followed a research and development (R&D) process, including curriculum design, expert validation, implementation with a group of basic education teachers, and evaluation of outcomes.

2. Literature Review

2.1. Research Skills for Learning Management

Research skills have been defined in education as the knowledge and ability to conduct systematic inquiry aimed at solving problems and generating new knowledge for instructional improvement Mertler [20]. Berikkhanova, et al. [21] conceptualizes research skills as the integration of knowledge and practice, reflected in teachers' ability to design and carry out research activities and evaluate the quality of their work. Similarly, Dikilitaş and Bostancıoğlu [12] describe research skills as a set of activities that involve questioning, hypothesizing, reviewing relevant theories, collecting data, and drawing conclusions that contribute to the creation of new knowledge. Watson and Burr [22] further emphasize the scientific foundation of these skills, framing them as the capacity to apply appropriate scientific methods and critical thinking in order to investigate classroom phenomena. Chwistek [23] highlights a practical dimension, defining research skills as the ability to identify problems, locate and evaluate reliable information, and apply evidence effectively in addressing those problems.

Synthesizing across these perspectives, research skills for teachers can be defined as the capacity to systematically examine teaching and learning problems through scientific methods. This process begins with identifying questions and formulating hypotheses, continues with reviewing theoretical foundations and collecting data, and culminates in the interpretation of findings to improve learning management and generate new insights. The importance of research skills for teachers lies in their role as a foundation for professional growth and instructional innovation. Research skills enhance reasoning, strengthen the ability to link knowledge domains, and cultivate analytical and problem-solving capacities that

are central to educational practice [24, 25]. Consequently, teachers with research skills are at a better position to design an instruction that aligns both disciplinary knowledge and student needs.

2.2. Previous Studies on the Development of Teachers' Research Skills

2.2.1. Curriculum and Training Program Development

Efforts to strengthen teachers' research skills have been addressed through various approaches in teacher education and professional development. One line of work emphasizes the design of curricula and structured training programs. Tatto [26] discusses how research-based teacher education frameworks contribute to the professionalization of teaching by embedding inquiry-oriented competencies into training models. Similarly, Kraft, et al. [27] examine the effectiveness of professional development programs and demonstrate that structured training initiatives are instrumental in enhancing teachers' capacity to engage with evidence and apply research in instructional decision-making. Calderhead [9] adds a conceptual perspective, arguing that research on teachers' thinking provides a foundation for developing teacher education curricula that nurture reflective inquiry and research-mindedness. Collectively, these studies suggest that curriculum design and programmatic interventions are vital avenues for cultivating teachers' research competence.

2.2.2. Action Research and Classroom-Based Inquiry

A second body of literature highlights action research and classroom-based inquiry as a means of developing research skills. Van Katwijk, et al. [28] show how research activities embedded in teacher education programs contribute directly to the professional growth of student teachers, particularly by encouraging systematic reflection on practice. Likewise, Tuchyna and Kamynin [29] emphasize the integration of action research into pre-service teacher education as a pathway for building reflective capacity, problem-solving skills, and professional autonomy. These studies demonstrate that classroom-based research not only equips teachers with methodological knowledge but also fosters habits of inquiry that are transferable to diverse teaching contexts.

2.2.3. Technology-Enhanced and Blended Learning Approaches

Another strand of research explores the role of technology-enhanced and blended learning approaches in developing teachers' research capacity. Şentürk [30] finds that blended professional development environments support teachers in acquiring both academic knowledge and 21st-century skills, while simultaneously promoting inquiry-oriented practices. Such studies underscore the potential of digital platforms to expand access to professional learning opportunities and to provide flexible models for developing research skills.

2.2.4. Teacher Identity and Professional Growth

Finally, some studies focus on research capacity as an integral component of teacher identity and professional growth. Batman and Saka [31] report that reflective practices, including the use of reflective diaries and micro-teaching, enhance pre-service teachers' capacity to evaluate their own teaching, plan improvements, and internalize a research-oriented mindset. These findings highlight the broader professional benefits of research engagement, including greater self-efficacy, stronger reflective dispositions, and enhanced professional identity.

2.3. Synthesis and Research Gap

Overall, existing research demonstrates that teachers' research skills can be enhanced through diverse approaches, including structured training curricula, classroom-based action research, technology-supported professional development, and reflective practice. These initiatives have collectively advanced teacher professional learning and contributed to improved instructional practices. However, few studies have systematically designed and empirically tested a dedicated training curriculum that explicitly integrates research skill development with teachers' learning management practices to promote students' 21st-century competencies.

To address this gap, the present study pursues two objectives:

1. To develop a research training curriculum aimed at strengthening basic education teachers' research skills for enhancing learning management.
2. To implement and evaluate the effectiveness of the training curriculum in improving teachers' research skills, learning management practices, and their capacity to foster 21st-century competencies among students.

3. Research Methodology

3.1. Research Design

This study employed a research and development (R&D) design to create and evaluate a training curriculum aimed at strengthening teachers' research skills for enhancing learning management and fostering students' 21st-century competencies. The study was implemented in two phases.

Phase 1: Curriculum Development involved reviewing relevant literature, drafting the training curriculum, obtaining expert validation, and revising the curriculum based on expert feedback.

Phase 2: Curriculum Implementation and Evaluation included administering the finalized curriculum to a group of basic education teachers, assessing their research skills before and after training, and examining their satisfaction with the program.

3.2. Participants

Phase 1: Expert Validation 2 groups

Group 1 : Five experts use interview protocol for curriculum development.

Group 2 : Seven experts in curriculum development, educational research, and teacher professional development were purposively selected to provide feedback on the initial draft of the training curriculum. The selection criteria included:

1. A minimum of five years of experience in teaching professional development or curriculum design.

2. At least one publication or academic work related to teacher training, curriculum development, or research methodology.

3. Current or previous involvement in designing or evaluating educational training programs.

Their expertise ensured the content validity, appropriateness, and feasibility of the proposed curriculum components.

Phase 2: Curriculum Implementation

Fifteen basic education teachers from Ban Don School under the Office of Primary Education Service Area, Region 3, volunteered to participate in the implementation phase. All participants were actively teaching in different subject areas, representing diverse teaching contexts within basic education.

3.3. Instruments

3.3.1. Phase 1: Curriculum Development and Expert Validation

1) Interview Protocol for Curriculum Development

An open-ended interview protocol was developed to elicit expert opinions on the design of a research training curriculum for basic education teachers. Questions focused on essential research skills, appropriate training activities, curriculum structure, and practical implementation issues.

2) Curriculum Quality Evaluation Form

The Curriculum Quality Evaluation Form was developed to assess both the appropriateness and feasibility of the training curriculum. The instrument comprised 24 items covering ten main components: (1) Principles of the curriculum (2) Objectives of the curriculum (3) Content and training hours (4) Training format (onsite/online) (5) Target group/participants (6) Facilitators (7) Learning activities (8) Learning resources (9) Assessment and evaluation methods, and (10) Outputs and outcomes.

3) Curriculum Implementation Manual

A user-friendly manual was developed to guide trainers and participating teachers in using the curriculum. It contained detailed instructions on learning objectives, session plans, training activities, and assessment methods, ensuring consistency and fidelity during implementation.

3.3.2. Phase 2: Curriculum Implementation and Impact Assessment

1) A Research Training Curriculum for Basic Education Teachers to Enhance 21st-Century Student Competencies

The main intervention was the research training curriculum, structured into seven modules delivered over two full training days: (1) Student competencies in the 21st century, (2) Developing tools to measure students' 21st-century competencies, (3) Learning management practices that enhance students' 21st-century competencies, (4) Designing lesson plans for learning management that promotes students' 21st-century competencies, (5) Designing research models to improve learning management that promotes students' 21st-century competencies, (6) Presenting learning management plans and research tools for 21st-century competencies, and (7) Data analysis and research report writing for learning management promoting students' 21st-century competencies. The curriculum was grounded in constructivist learning principles, andragogical approaches for adult learners, and the ADDIE instructional design model. Training activities combined workshops, collaborative projects, peer review sessions, and reflective discussions. Sample tasks included designing small-scale action research proposals, developing assessment tools, analyzing sample datasets, and preparing research-based lesson plans aimed at enhancing students' 21st-century competencies.

2) Research knowledge test: A 30-item multiple-choice knowledge test was developed to assess participants' understanding of educational research concepts covered in the training curriculum. The test items reflected key content areas across the seven modules, including research design, data collection, data analysis, and research-based learning management. Content validity (IOC = 1.00 all item) was confirmed by five experts.

3) Teacher Learning Management Competency assessment form: The Teacher Learning Management Competency assessment form has two forms: Form 1 for the research team as expert assessment was a rubric, and Form 2 for teacher participants as self-assessment was a Likert scale. The Teacher Learning Management Competency Assessment Questionnaire was administered after the training to evaluate teachers' perceived competencies in research-informed learning management. The instrument measured three domains: Research proposal design skills, Research tool construction skills, and Data analysis and report writing skills. Content validity was verified by five experts (IOC = 1.00 all item), and pilot-tested by assessing the research completed by educators outside the sample group. Two evaluators were invited to appraise the work, and inter-rater reliability was evaluated by computing the rater agreement index (RAI) [32] and yielded a score of 1.00. If the RAI is higher than .90, it is considered a big effect [33].

4) Satisfaction questionnaire: The Satisfaction Questionnaire was administered after the training to evaluate teachers' perceptions of the curriculum's quality and usefulness. There are 22 items covering three aspects: general satisfaction with the curriculum (10 items), usefulness of the curriculum (6 items), and feasibility of application (6 items). Each item used a

five-point Likert scale (1 = strongly disagree to 5 = strongly agree). Content validity was confirmed by three experts (IOC = 0.80–1.00).

3.4. Data Collection and Analysis

Data were collected in two phases. Phase 1 involved expert interviews and a curriculum quality evaluation form (5-point Likert scale) to design and validate the training curriculum. Phase 2 included a post-training self-assessment questionnaire measuring three domains—research-based lesson planning, research-informed instructional strategies, and research-guided student-centered assessment—along with reflective journals and classroom observations to provide qualitative insights. Quantitative data were analyzed using mean scores, standard deviations, and a one-sample t-test to compare post-test scores against the 70% proficiency benchmark (3.5/5), with interpretation based on a five-level scale (1.00–1.50 = very low, 1.51–2.50 = low, 2.51–3.50 = moderate, 3.51–4.50 = high, 4.51–5.00 = very high). Qualitative data underwent thematic analysis to complement and explain the quantitative results.

4. Results

4.1. Phase 1 Results: Curriculum Development and Expert Validation

The first phase focused on developing a research training curriculum for basic education teachers to enhance students' 21st-century competencies and validating its quality through expert review. The findings are presented in two parts:

Components of the course curriculum and curriculum quality evaluation.

Components of the course curriculum, which has ten main components:(1) Principles of the curriculum (2) Objectives of the curriculum (3) Content and training hours (4) Training format (onsite/online) (5) Target group/participants, (6) Facilitators, (7) Learning activities, (8) Learning resources, (9) Assessment and evaluation methods, and (10) Outputs and outcomes.

The training program was designed to be delivered in both onsite and online formats, targeting basic education teachers with specific qualifications and enrollment criteria. Expert facilitators with experience in classroom research and instructional innovation were selected to lead the sessions. The learning activities emphasized hands-on workshops, project-based research practice, experience sharing, reflective discussions, and presentation of outcomes. A variety of resources, including books, skill exercises, research databases (Thaillis, Google Scholar, Scispace, ThaiJo), and data analysis software (Excel), supported the training. Assessment covered methods, tools, and criteria to evaluate teachers' learning outcomes. The program aimed to enhance teachers' knowledge and research skills for improving learning management that fosters students' 21st-century competencies, resulting in both skill development and the creation of classroom research proposals.

Curriculum quality evaluation : According to Table 1, the evaluation of the training curriculum in Phase 1 showed overall high appropriateness ($\bar{X}$ = 4.82, SD = 0.43) with most components rated at the highest level. The course objectives, target groups, facilitators, learning activities, resources, assessment methods, and expected outcomes all received the highest rating ($\bar{X}$ = 5.00). The training content and allocated hours were also rated at the highest level ($\bar{X}$ = 4.64–4.71), and principles of the curriculum at the high ($\bar{X}$ = 4.43), indicating curriculum strong alignment with 21st-century learner competencies.

Table 1.
Appropriateness of the Training Curriculum.

Components of the Curriculum	$\bar{x}$	SD	Level
1. Principles of the curriculum	4.43	0.53	High
2. Objectives of the curriculum	5.00	0.00	Highest
3. Content and training hours	4.64	0.48	Highest
4. Training format (onsite/online)	5.00	0.00	Highest
5. Target group/participants	5.00	0.00	Highest
6. Facilitators	5.00	0.00	Highest
7. Learning activities (Workshop, project-based, reflection)	5.00	0.00	Highest
8. Learning resources (Books, databases, software)	4.71	0.49	Highest
9. Assessment and evaluation methods	4.71	0.49	Highest
10. Outputs and outcomes	4.71	0.49	Highest
Overall	4.82	0.43	Highest

4.2. Phase 2 Results: Implementation of the Training Curriculum

4.2.1. Demographic Information and Data Distribution

The results revealed that most teachers participating in the training curriculum were male (73.33%). They taught across eight subject groups including Thai Language (26.67%), Early Childhood Education, Mathematics, Health and Physical Education, and Science and Technology (13.33% each), as well as Foreign Languages, Social Studies, Religion and Culture, and Arts (6.67% each).

4.2.2. Comparison between Teachers' Research Knowledge Scores Before and After the Training

The normality test results of teachers' research knowledge scores before and after the training curriculum revealed that the data were normally distributed. Both Kolmogorov-Smirnov and Shapiro-Wilk tests showed significance (sig) values greater than 0.05. [34]. (Table 2).

Table 2.
Tests of Normality.

Test	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	0.12	15	0.20	0.97	15	0.83
Posttest	0.17	15	0.20	0.93	15	0.30

The comparison of teachers' research knowledge scores before and after participating in the training curriculum revealed that the posttest mean score was significantly higher than the pretest mean score. The t-test result indicated a statistically significant difference at the .05 level (Table 3).

Table 3.
Comparison of Teachers' Research Knowledge Scores Before and After the Training.

Test	$\bar{x}$	SD	t-test	Sig.
Posttest	23.93	3.88	6.01	0.00*
Pretest	13.93	5.84		

Note: *Sig. < 0.05.

4.2.3. Teacher Self-Assessment of Research Skills for Improving Learning Management

The analysis of teachers' self-assessment scores on research skills for improving learning management, compared with the 70% criterion, showed that the mean scores for all three skill domains—research design skills ($\dot{X}$ = 4.19, SD = 0.57), research tool construction skills ($\bar{x}$ = 4.07, SD = 0.56), and data analysis and report writing skills ($\bar{x}$ = 3.95, SD = 0.39)—were significantly higher than the criterion score of 3.5 at the .05 level. The overall mean score ($\bar{x}$ = 4.07, SD = 0.55) also exceeded the 70% benchmark, indicating that the training curriculum effectively enhanced teachers' research skills for learning management improvement. (Table 4).

Table 4.
Comparison of Research Skills for Improving Learning Management (Self-Assessment) with the 70% Criterion.

Research Skills (Self-Assessment)	Full Score	Criterion (70%)	$\bar{x}$	SD	t-test	Sig.
1. Research Design Skills	5	3.5	4.19	0.57	4.68	0.00*
2. Research Tool Construction Skills	5	3.5	4.07	0.56	3.90	0.00*
3. Data Analysis and Report Writing Skills	5	3.5	3.95	0.39	2.57	0.01*
Overall	5	3.5	4.07	0.55	4.01	0.00*

Note: *Sig. < 0.05.

4.2.4. Research Team's Assessment of Teachers' Research Skills for Improving Learning Management

The results of the research team's assessment of teachers' research skills for improving learning management, compared with the 70% criterion, revealed that the mean scores for all three domains—research design skills ($\bar{x}$ = 2.54, SD = 0.47), research tool construction skills ($\bar{x}$ = 2.67, SD = 0.49), and data analysis and report writing skills ($\bar{x}$ = 2.28, SD = 0.31)—were significantly lower than the criterion score of 2.1 at the .05 level. The overall mean score ($\bar{x}$ = 2.46, SD = 0.37) was also below the 70% benchmark, indicating that while teachers gained some research skills, further improvement is needed to meet the expected standard. (Table 5).

Table 5.
Comparison of Research Skills for Learning Management Development Assessed by the Research Team with the 70% Criterion

Research Skills	Full Score	Criterion (70%)	$\bar{x}$	SD	t-test	Sig.
1. Research Design Skills	3	2.1	2.54	0.47	3.67	0.00*
2. Research Tool Construction Skills	3	2.1	2.67	0.49	4.50	0.00*
3. Data Analysis and Report Writing skills	3	2.1	2.28	0.31	2.25	0.04*
Overall	3	2.1	2.46	0.37	3.74	0.00*

Note: *Sig. < 0.05.

During the training curriculum, teachers initially faced challenges in formulating research titles, as some were unsure which teaching methods would be most suitable for addressing learning problems in their classrooms. Through guidance from the research team—such as analyzing course structures, learning outcomes, and instructional issues—teachers were encouraged to reflect on teaching approaches they had used or found effective. This process enabled them to refine and develop appropriate research titles, with suggestions provided to make titles more concise, skill-focused, and aligned with active learning principles.

As the training progressed, teachers selected research variables and 21st-century skills based on the National Education Plan (2017–2021). Most focused on improving reading and writing abilities, while others explored collaboration, critical thinking, problem solving, and communication skills. Various teaching methods were applied, ranging from skill practice sets, educational games, and problem-based learning to cooperative learning models and storytelling activities, demonstrating a growing diversity in instructional strategies.

Overall, the training empowered teachers to design research projects grounded in classroom realities and student needs. The knowledge gained enabled them to integrate innovative teaching methods and 21st-century skill development into their practice, as reflected in the research topics and methods summarized. (Table 6).

Table 6.
Teachers' Research Focus Areas and Instructional Methods.

Teacher No.	Subject Area	21st-Century Skill(s)	Research method
1	Thai Language	Literacy	SQ4R Method
2	Thai Language	Literacy	Skill Practice Approach
3	Thai Language	Reading aloud and spelling	Skill Practice Approach
4	Thai Language	Reading and writing closed-syllable words	Skill Practice Approach
5	Mathematics	Teamwork	Educational Games
6	Mathematics	Problem-Solving	Problem-Based Learning
7	Science and Technology	Memory and Recall	Skill Practice Sets
8	Science and Technology	Critical Thinking	CIPPA Model
9	Early Childhood Education	Speaking	Storytelling with Pictures
10	Early Childhood Education	Basic Mathematical Skills	Educational Games
11	Health Education	Teamwork	Collaborative Learning
12	Health Education	Self-Discipline	Problem-Based Learning
13	Foreign Language	Speaking	MIA+PWP Model
14	Art Education	Thai Classical Dance Skills	Complete Lesson Study
15	Social Studies, Religion, and Culture	Communication Skills	5E Model

4.2.5. Participants' Satisfaction with the Training Curriculum

Overall, the training curriculum achieved an average satisfaction score at the highest level ($\bar{X}$ = 4.72). General satisfaction with the curriculum and the usefulness of the curriculum at the highest level ($\bar{X}$ = 4.72), and feasibility of application ($\bar{X}$ = 4.64), confirming that the program effectively met its objectives and participants' expectations. (Table 7).

Table 7.
Participants' satisfaction with the training curriculum.

Aspect	$\bar{x}$	SD	Satisfaction Level
General satisfaction with the curriculum	4.76	0.31	Highest
Usefulness of the Curriculum	4.76	0.38	Highest
Feasibility of Application	4.64	0.39	Highest
Overall	4.72	0.31	Highest

5. Discussion

The findings indicate that the research training curriculum was generally effective in enhancing teachers' research-informed learning management competencies. The combination of workshops, collaborative projects, and reflective activities provided teachers with hands-on experiences in designing, implementing, and evaluating classroom research. This approach aligns with adult learning principles and constructivist pedagogy, which emphasize active engagement, problem-solving, and the integration of new knowledge into existing teaching practices.

The significant gains in teachers' post-training self-assessment scores suggest that the curriculum succeeded in equipping teachers with practical research skills applicable to their classroom contexts. These results are consistent with previous studies, such as Punchaariyakun [35]; Tatto [26]; Kraft, et al. [27] and Sintuprasert and Tongaram [36] who found that structured training programs play a critical role in strengthening teachers' research capacity. Likewise, Van Katwijk, et al. [28] and Tuchyna and Kamynin [29] highlight that classroom-based research activities foster reflective practice and professional growth, which aligns with the present study's findings that teachers perceived research skills as tools for enhancing students' 21st-century competencies. Furthermore, studies by Şentürk [30] and Batman and Saka [31] suggest that blended learning approaches and reflective practices can enhance teachers' professional identity and research-mindedness, supporting the notion that research engagement contributes both to instructional improvement and to long-term professional development.

However, some challenges emerged during implementation. A few teachers expressed difficulty managing the dual demands of classroom teaching and conducting systematic research within limited time frames. Others noted that interpreting data and aligning research findings with curriculum standards required additional support beyond the training sessions. These challenges highlight the need for ongoing mentoring and institutional support to sustain teachers' research engagement over time. Similarly, they echo broader research indicating that enhanced teacher research capabilities often

come with heightened challenges, such as time constraints and the demand for sustained institutional and mentoring support [37].

Despite these challenges, teachers perceived research skills not merely as academic requirements but as essential tools to foster students' 21st-century competencies—critical thinking, problem-solving, collaboration, and self-directed learning. It can be assumed that employing research findings into lesson planning and instructional strategies allowed teachers to develop greater confidence in designing learning experiences that respond to students' diverse needs. This aligns with Basilio and Bueno [38] who emphasized that research skill development is closely linked to positive attitudes toward the teaching profession. The training curriculum: therefore, was able to develop teachers' professional capacities and encouraged a culture of evidence-based teaching, laying groundwork for continuous instructional improvement in the future.

6. Conclusion

This study developed and implemented a research training curriculum designed to enhance teachers' research-informed learning management competencies. The curriculum incorporated workshops, collaborative projects, peer review sessions, and reflective activities across seven modules delivered over two days. Post-training results showed that teachers improved in research-based lesson planning, instructional strategies, and student-centered assessment, with self-assessment scores exceeding the 70% proficiency benchmark. These findings contribute to the growing body of work on professional development by demonstrating how structured, research-oriented training can strengthen teachers' capacity to integrate classroom inquiry into 21st-century learning practices.

The findings imply that integrating research skills into teacher professional development can foster reflective practice, evidence-based decision-making, and innovation in classroom instruction. However, the study was limited by its reliance on self-reported measures and the absence of a long-term follow-up to assess sustained impact. Future research should consider mixed-method designs with classroom performance indicators, larger samples, and longitudinal studies to capture how research engagement influences teaching practices and student outcomes over time.

References

[1] A. Cleesuntorn, "Thai education and the 21st century skills: A proposal for a new world of work," *Life Sciences and Environment Journal*, vol. 16, no. 2, pp. 131-142, 2015.

[2] H. Delaney, "Education for the 21st century |," UNICEF Thailand, 2016. https://www.unicef.org/thailand/stories/education-21st-century

[3] A. Dilekçi and H. Karatay, "The effects of the 21st century skills curriculum on the development of students' creative thinking skills," *Thinking Skills and Creativity*, vol. 47, p. 101229, 2023. https://doi.org/10.1016/j.tsc.2022.101229

[4] Partnership for 21st Century Skills, "Framework for 21st century learning," 2009. http://www.teacherrambo.com/file.php/1/21st_century_skills.pdf

[5] B. Trilling and C. Fadel, *Learning and innovation skills: 21st century skills learning for life in our times*. San Francisco, CA: Jossey-Bass, 2009.

[6] Office of the Basic Education Commission, *Basic education development plan 2023-2027 of the office of the basic education commission*. Bangkok: Office of the Basic Education Commission, 2022.

[7] U. Sihawong and S. Phusee-orn, "Developing a model to enhance junior high school teacher 21st century learning management competencies," *Journal of Education and Learning*, vol. 13, no. 1, pp. 101-110, 2024.

[8] C. L. Scott, *The futures of learning 2: What kind of learning for the 21st century?* Paris: UNESCO, 2015.

[9] T. Wagner, *The global achievement gap: Why even our best schools don't teach the new survival skills our children need—and what we can do about it*. New York: Basic Books, 2010.

[10] J. Calderhead, *The contribution of research on teachers' thinking to the professional development of teachers in routledge library editions: education mini-set n: teachers & teacher education research*. London: Routledge, 2012.

[11] B. Clinton, F.-P. Lorraine, and H. Chris, *All senior lecturers, westminster researching into teaching methods: In colleges and universities*. London: Routledge, 2014.

[12] K. Dikilitaş and A. Bostancıoğlu, *Inquiry and research skills for language teachers*. Cham, Switzerland: Springer Nature, 2019.

[13] J. L. Kincheloe, *Teachers as researchers: Qualitative inquiry as a path to empowerment*, 2nd ed. London: Routledge, 2002. https://doi.org/10.4324/9780203497319

[14] P. Fongkanta, F. S. Buakanok, A. Netasit, and S. Kruaphung, "Teacher professional development in research skill of teacher in non-formal education center, Lampang, Thailand," *Journal of Education and Learning*, vol. 11, no. 1, pp. 125-131, 2022.

[15] W. Panich, *The path to creating learning for students in the 21st century*. Bangkok: Sodsri-Saritwong Foundation, 2012.

[16] Royal Thai Government Gazette, *National strategy (2018–2037)*. Bangkok, Thailand.: Royal Thai Government Gazette, 2018.

[17] W. N. Bender and L. Waller, *The teaching revolution*. Thousand Oaks, CA: Corwin, 2011.

[18] D. Jamjuree, "Teacher training and development in Thailand," *Journal of Research and Curriculum Development*, vol. 7, no. 2, pp. 7–19, 2018.

[19] C. Punyasavatsut, *Teacher career reforms in Thailand*. Paris: UNESCO, 2019.

[20] C. A. Mertler, "Action research as teacher inquiry: A viable strategy for resolving problems of practice," *Practical Assessment, Research & Evaluation*, vol. 26, no. 1, p. 19, 2021. https://doi.org/10.7275/22014442

[21] A. Berikkhanova *et al.*, "Conceptualising the integration of action research into the practice of teacher education universities in Kazakhstan," *Education Sciences*, vol. 13, no. 10, p. 1034, 2023. https://doi.org/10.3390/educsci13101034

[22] H. R. Watson and S. Burr, "Research skills in medical education," *MedEdPublish*, vol. 7, p. 151, 2018. https://doi.org/10.15694/mep.2018.0000151.1

[23] B. Chwistek, "Research skills: What they are and how they benefit you," Immerse Education, 2025. https://www.immerse.education/student-life/academic-life/research-skills-a-guide/

[24] N. R. C. National Academies of Science, *Education for life and work: Developing transferable knowledge and skills in the 21st century*. Washington, D.C: National Academies Press, 2012.
[25] A. Paniagua and Istance, *Teachers as designers of learning environments*. Paris, France: OECD Publishing, 2018.
[26] M. T. Tatto, "Developing teachers' research capacity: The essential role of teacher education," *Teaching Education*, vol. 32, no. 1, pp. 27-46, 2021. https://doi.org/10.1080/10476210.2020.1860000
[27] M. A. Kraft, J. P. Papay, and O. L. Chi, "Teacher skill development: Evidence from performance ratings by principals," *Journal of Policy Analysis and Management*, vol. 39, no. 2, pp. 315-347, 2020. https://doi.org/10.1002/pam.22193
[28] L. Van Katwijk, E. Jansen, and K. Van Veen, "Pre-service teacher research: A way to future-proof teachers?," *European Journal of Teacher Education*, vol. 46, no. 3, pp. 435-455, 2023. https://doi.org/10.1080/02619768.2021.1928070
[29] N. Tuchyna and I. Kamynin, "Developing research competence of pre-service EFL teachers," *Educational Challenges*, vol. 27, no. 2, pp. 216-227, 2022. https://doi.org/10.34142/2709-7986.2022.27.2.15
[30] C. Şentürk, "Effects of the blended learning model on preservice teachers' academic achievements and twenty-first century skills," *Education and Information Technologies*, vol. 26, no. 1, pp. 35-48, 2021. https://doi.org/10.1007/s10639-020-10340-y
[31] D. Batman and A. Z. Saka, "The effects of micro-reflective teaching practices on the professional skill development of pre-service physics teachers," *Turkish Online Journal of Educational Technology*, vol. 20, no. 4, pp. 117-131, 2021.
[32] P. Worakam, *Educational research*, 14th ed. Bangkok, Thailand: Taksila Printing, 2024.
[33] L. Bartok and M. A. Burzler, "How to assess rater rankings? A theoretical and a simulation approach using the sum of the pairwise absolute row differences (PARDs)," *Journal of Statistical Theory and Practice*, vol. 14, no. 3, p. 37, 2020. https://doi.org/10.1007/s42519-020-00103-w
[34] S. Phusee-orn, *Application of SPSS for research data analysis*, 8th ed. Bangkok, Thailand: Taksila Printing, 2018.
[35] S. Punchaariyakun, "The development of training course curriculum in classroom action research," *Journal of Graduate Studies in Northern Rajabhat Universities*, vol. 9, no. 2, pp. 33-48, 2019.
[36] A. Sintuprasert and P. Tongaram, "The development of a training course to develop classroom action research skills for students of faculty of educationat Phranakhon Si Ayutthaya Rajabhat University," *Journal of Institute of Trainer Monk Development*, vol. 8, no. 2, pp. 222-234, 2025.
[37] A. A. Amenabar and P. Pontillas, "Action research capabilities and challenges: Basis for research enhancement plan," *American Journal of Arts and Human Science*, vol. 3, no. 3, pp. 150-170, 2024. https://doi.org/10.54536/ajahs.v3i3.3086
[38] M. B. Basilio and D. C. Bueno, "Research skills and attitudes of master teachers in a division towards capability training," Online Submission, 2019.