The Results of Research Competencies Developed for Learning Development of Nakhon Sawan Rajabhat University's Student Teachers

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Abstract
This research is aimed at examining the effects of developing research competencies to enhance the current learning of student teachers at Nakhon Sawan Rajabhat University. This study focuses on participants before, during, and after the implementation of the proposed model. The sample consists of 35 fourth-year students enrolled in the Bachelor of Education program during the first semester of the 2024 academic year at the Faculty of Education, Nakhon Sawan Rajabhat University, and were selected through multi-stage sampling. The research instruments include: A research competency development program aimed at enhancing learning, A multiple-choice test with four options consisting of 15 items to assess their acquired knowledge related to research for learning development. A 15-item, 5-point rating scale to evaluate research skills for learning development. A 15-item 5-point rating scale to assess attitudes toward research for learning development, along with a 15-item, 3-point rating scale to evaluate research report. This data was analyzed using mean, standard deviation, and repeated measures and a one-way analysis of these variances. The research results found that Student Teachers demonstrated significantly higher research knowledge and research skills for learning development after implementing the model compared to during and before the implementation, with statistical significance at the .05 level. Additionally, their personal attributes after implementing the model were significantly higher than those before the implementation, also at the .05 level of significance. However, the difference in personal attributes between the post-implementation and during the implementation stages was not statistically significant. Lastly, the evaluation of research report indicated a high level of quality.
Keywords: Research Competencies, Research for Learning Development, Student Teachers

Introduction

Teachers are individuals worthy of respect and reverence, embodying selflessness for the growth and development of their students. The prosperity of a nation relies heavily on its citizens receiving quality education from competent teachers. Enhancing the quality of teachers begins with nurturing students pursuing degrees in education, such as Bachelor of Education (B.Ed.) or equivalent programs, as these individuals aspire to become future educators. Universities with faculties of education bear the critical responsibility of producing competent teaching graduates. This is achieved through academic curricula and activities aimed at fostering essential qualities in education students, aligned with societal expectations. These include possessing comprehensive knowledge in various disciplines, effectively transferring knowledge and skills to learners, mastering the subjects they teach, upholding professionalism, and cultivating desired qualities in students as outlined by educational curricula. Furthermore, teachers should serve as role models

through their exemplary personality and character. The role of teachers is pivotal in driving economic and social development and addressing societal challenges. To ensure that teacher training institutions uphold professional standards, it is essential to have organizations tasked with defining, regulating, and monitoring these standards. The Teachers' Council of Thailand, commonly known as the Khurusapha, fulfills this role. Although teacher training institutions are not directly governed by Khurusapha, any curriculum related to teacher preparation must be accredited by this body before implementation.

Beyond overseeing teacher education curricula, Khurusapha plays a vital role in developing the standards of professional knowledge and teaching experience. In 2019, the council introduced the Professional Teacher Standards (4th Edition), encompassing six key domains: (1) Global Contexts, Societal Changes, and the Philosophy of Sufficiency Economy, (2) Developmental, Educational, and Counseling Psychology - to analyze and nurture students based on their potential, (3) Subject Content, Curriculum, Pedagogy, and Digital Technology - for effective learning facilitation, 4) Assessment, Evaluation, and Research - to solve problems and foster student development, 5) Language Proficiency and Digital Literacy - for communication and educational purposes and 6) Educational Quality Assurance Design and Implementation. Each domain integrates both knowledge and competencies. For example, in the domain of Assessment, Evaluation, and Research, teachers are expected to possess knowledge of learning assessments and research methodologies for addressing educational challenges. The associated competencies include the ability to evaluate student learning outcomes, utilize assessment results for student development, apply research findings in teaching, and conduct research to enhance instruction and foster student growth. By maintaining these rigorous standards, Khurusapha ensures that teacher training aligns with professional excellence, contributing to the advancement of education and the betterment of society.

The research competencies defined in the Professional Teacher Standards by Khurusapha align closely with those outlined by the Office of the Basic Education Commission (OBEC). OBEC's Competency 4 emphasizes Analysis, Synthesis, and Research for Student Development, which includes the ability to understand, break issues into components, systematically compile and conclude findings, and apply them to research aimed at student development. It also highlights the ability to analyze organizational or task-related issues and solve problems systematically for work improvement.

The key indicator for research competency in this context is the ability to conduct research for student development. Teachers are expected to develop a research plan, Systematically verify the validity and reliability of research outcomes, Apply research findings to other case studies with similar problem contexts, ensuring alignment with existing research findings. This perspective is supported by Nantiya (2009) synthesis of teacher research competency indicators, which identifies three critical components: Knowledge and Understanding in Research, Research Skills, Positive Attitudes Toward Research. These components are consistent with the research competencies for teachers outlined by Khurusapha, which include Utilizing research findings to improve teaching and learning processes, Conducting research to enhance instructional methods and student development. Promtong (2014) further synthesized global researcher competencies by analyzing data from APEC-Deloitte Consulting and related studies. The synthesis highlights that the competencies essential for researchers in 2020 focus on three core areas: Scientific Competencies, Project and Team Management Skills, and Personal Aptitude and Interpersonal Skills These findings reflect the evolving expectations for educators and researchers to integrate comprehensive scientific understanding, practical application skills, and collaborative capabilities in both educational and research contexts. This alignment ensures that teachers not only excel in pedagogy but also contribute to systematic and evidence-based approaches to improving student learning outcomes.

Competencies vary across professions, shaped by the nature of work and the requirements for personal development, performance evaluation, or recruitment. Academics and educators have defined the term "competency" in ways that are consistent

and complementary. McClelland (1973) defined competency as intrinsic characteristics within individuals that drive them to achieve outstanding or expected performance in their responsibilities. He categorized competencies into two groups: 1) Threshold Competencies: Basic abilities necessary for job performance, 2) Differentiating Competencies: Characteristics that distinguish individuals from others in achieving superior performance.

In Thailand, the Professional Qualifications Institute provided two definitions of competency: 1) General Meaning: The ability to perform tasks effectively and efficiently by integrating knowledge, skills, and attitudes. 2) Professional Meaning: The capacity to execute tasks in a professional setting, utilizing integrated knowledge, skills, and attitudes to achieve efficient and impactful outcomes. Surachai (2011) elaborated on competencies as comprising three key components: 1) Knowledge: Theoretical and practical understanding relevant to the profession. 2) Skills: Practical abilities and techniques required for task execution. 3) Attributes: Personal qualities or behaviors essential for effective performance. From these definitions, competencies can be summarized as the attributes and qualifications aligned with specific job roles, duties, and responsibilities as defined by organizations. Generally, competencies include three critical dimensions: Knowledge, Skills and Personal Attributes or Attitudes

Research competencies, particularly for researchers in education, can be understood as attributes that reflect knowledge, skills, and personal characteristics essential for research. These competencies are critical for teacher education students, such as those pursuing Bachelor of Education (B.Ed.) or Bachelor of Science in Education (B.Sc. Ed.) programs. Developing research competencies among teacher education students is crucial for fostering innovative learning and teaching practices.

Key research competencies include: Knowledge in Research for Learning Development – Understanding research methodologies, tools, and their application to enhance learning. Research Skills for Learning Development – Practical skills in planning, conducting, and analyzing research to address educational challenges. Personal Attributes for Research – Attitudes and behaviors that support perseverance, critical thinking, and collaboration in research.

These competencies equip future educators with the ability to design effective learning environments and strategies, utilizing research-based insights to improve teaching outcomes. By embedding research competencies in teacher education programs, institutions empower educators to adapt, innovate, and inspire learning in diverse contexts.

Research Objectives

To study the outcomes of developing research competencies for learning enhancement among student teachers at Nakhon Sawan Rajabhat University participating in the program, focusing on the periods before, during, and after the experimental implementation of the model.

Research Hypothesis

There is a significant difference in the research competencies of student teachers at Nakhon Sawan Rajabhat University across the three time periods: before, during, and after the implementation of the learning enhancement model.

Literature Reviews

The researcher studied the concepts and theories as follows:

1) Research for Learning Development is a systematic process of inquiry aimed at uncovering truths or knowledge to enhance or solve issues within the learning process. The ultimate goal is to enable learners to achieve their full potential through tailored educational approaches. In this context, educators act as both researchers and practitioners, utilizing the findings of their research to refine and optimize teaching strategies. This form of research is closely aligned with Classroom Action Research, which is often referred to as "research in the classroom."

2) Research Competency for Learning Development refers to the attributes that demonstrate knowledge, skills, and personal characteristics related to research for the development of learning among student teachers. It is divided into three components:

Component 1: Knowledge Competency for Research to Develop Learning

This refers to the knowledge that student teachers have regarding research aimed at learning development. It includes understanding the content related to identifying problems for improving learning, designing learning processes, collecting data, analyzing data, and writing research proposals or research reports.

Component 2: Skill Competency for Research to Develop Learning

This refers to the ability of student teachers to perform research aimed at learning development. It involves practical experience in research activities, such as the ability to analyze problems for learning development, design learning processes, collect data, analyze data, and write research proposals or research reports.

Component 3: Personal Characteristics Competency

This refers to the behaviors demonstrated by student teachers that reflect research ethics, determination, curiosity in research, and acceptance of learner diversity, all of which are essential for conducting successful research.

The Model for Developing Research Competency for Learning Development of Student Teachers refers to the process or steps involved in developing research competencies for learning enhancement among student teachers. This model focuses on practical research skills for learning development and utilizes research-based learning strategies. It includes principles, objectives, content, development processes, assessment, and evaluation methods for the model. The model also provides guidelines for its implementation, with five key activities for student teachers: Workshops, Self-directed Learning, Practical Experience in Real Situations, Follow up though Coaching and Mentoring, Presentation of Work Outcomes.

Research Methodology

The research on studying the effects of developing research competencies for learning development of student teachers at Nakhon Sawan Rajabhat University was designed by the researcher according to the following research methodology:

Population and Sample Group

Population: The population consists of fourth-year students enrolled in the Bachelor of Education program during the first semester of the 2024 academic year at the Faculty of Education, Nakhon Sawan Rajabhat University, totaling 450 students.

Sample: The sample consists of 35 students from the fourth-year Bachelor of Education program during the first semester of the 2024 academic year at the Faculty of Education, Nakhon Sawan Rajabhat University. The sample was selected using a multi-stage sampling method, with the following procedures:

- There are 450 students in the fourth-year Bachelor of Education program, divided into 9 academic disciplines.
- Randomly select 50% of the academic disciplines using simple random sampling. A total of five disciplines were selected: Social Studies, Thai Language, Science, Early Childhood Education, and Digital Technology for Education.
- Calculate the number of students proportionally from each field of study.
- Students were proportionally sampled from each academic discipline using a simple random sampling method, with 5 students selected from each discipline, totaling 35 students.

Variables

Independent Variable: The experimental use of the model for developing research competencies for learning development among student teachers.

Dependent Variable: The research competencies for learning development of student teachers at Nakhon Sawan Rajabhat University, which are categorized into three aspects:
- Knowledge in research for learning development
- Skills in research for learning development
- Personal characteristics in research for learning development

Research Design

The research design used to test the model for developing research competencies for learning development among student teachers at Nakhon Sawan Rajabhat University is a single-group design with multiple time points. The research

competencies for learning development of student teachers were evaluated three times: before the trial of the model, during the trial of the model, and after the trial of the model. This type of assessment allows for an understanding of the trends in how the intervention affects the participants, whether it leads to an increase, decrease, or development over time (Songsak, 2009). The researcher has set the following time points for assessing research competencies for learning development:

Before the trial of the model: The researcher conducts the assessment of research competencies for learning development before the trial of the model.

During the trial of the model: The researcher conducts the assessment of research competencies for learning development during the trial, two months after the trial has started.

After the trial of the model: The researcher conducts the assessment of research competencies for learning development after the complete implementation of the model.

However, the repeated measures research design has the following considerations; repeated testing of participants may lead to learning effects or familiarity with the test. Additionally, Uncontrolled factors may influence the results.

Research Instruments

1. The Model for Developing Research Competencies for Learning Development of Student Teachers at Nakhon Sawan Rajabhat University consists of the background, principles, objectives, teaching methods, assessment and evaluation, outcomes, and conditions. The model was evaluated for quality in terms of appropriateness and accuracy by five experts. The evaluation results indicated that the model's quality in terms of appropriateness was rated at the highest level, and the quality in terms of feasibility was also rated at the highest level.

2. Instruments for Assessing Research Competencies for Learning Development of Student Teachers at Nakhon Sawan Rajabhat University

Knowledge Test on Research for Learning Development: This is a multiple-choice test with 4 options and 15 items. The researcher tested these instruments with 50 student teachers in their 4th year

during the 2023 academic year. The difficulty index ranges from 0.40 to 0.76, and the discrimination index is between 0.22 and 0.32. The test was trialed with 30 students, and the reliability coefficient (using KR-21) was found to be 0.72.

Research Skill Evaluation for Learning Development: This is a 5-point Likert scale with 15 items. The researcher tested these instruments with 50 student teachers in their 4th year during the 2023 academic year. The item discrimination index, calculated from the correlation coefficients between individual item scores and the total score excluding the item, ranges from 0.69 to 0.87. The reliability, measured by Cronbach's Alpha, is 0.91.

Attitude Towards Research for Learning Development Evaluation: This is a 5-point Likert scale with 15 items. The researcher tested these instruments with 50 student teachers in their 4th year during the 2023 academic year. The item discrimination index ranges from 0.64 to 0.73. The reliability, measured by Cronbach's Alpha, is 0.90.

Research Performance Evaluation for Learning Development: This is a 3-point Likert scale with 15 items, adapted from the Office of the Teacher Council Secretariat. It was reviewed for appropriateness by 5 experts, and all items were found to have content validity with a score of 1 for each item.

Data Collection Procedure

The activities involved in the trial use of the model with student teachers participating in the experiment are as follows:

Activities	Duration
assessment before the trial	1 day
Workshop Training	3 days
Practical Training in Real Situations	1 Term (4 months)
Self-directed Learning	1 Term (4 months)
Follow-up through Coaching and Mentoring	3 Times
Assessment during the trial	1 day
Presentation	1 day
Assessment after the trial	1 day

Data Analysis

The statistical methods used for data analysis include: percentage, mean, standard deviation and repeated measures and a one-way analysis of these variances to test the trend of the experimental model across three aspects if there are significant changes in the three different dimensions (aspects) being measured across the repeated assessments (before, during, and after the intervention)The three aspects might be: Knowledge Competency in Research for Learning Development, Skill Competency in Research for Learning Development and Personal Characteristics Competency in Research for Learning Development

Research Knowledge Competency for Learning Development

This competency is assessed by the tool measuring the research knowledge for learning development, which is a multiple-choice test with 4 options consisting of 15 questions. The total score is 15 points. The scoring criteria are as follows: Correct answer: 1 point, Incorrect answer: 0 points

Research Skills Competency for Learning Development

This competency is assessed by the tool measuring research skills for learning development, which is evaluated by a team of 3 assessors. The total score for the research skills competency assessment is 75 points, based on a 5-point Likert scale evaluation (with 15 items). The scoring criteria for research skills are as follows: Level 5: Most (highest), Level 4: High, Level 3: Moderate, Level 2: Low, Level 1: Lowest.

Personal Attributes Competency

This competency is assessed by the tool measuring personal attributes competency, which is a 5-point Likert scale evaluation consisting of 10 items. The total score is 50 points. The scoring criteria for the behavior assessment are as follows: Level 5: Most (highest), Level 4: High, Level 3: Moderate, Level 2: Low, Level 1: Lowest.

Evaluation of Research Work for Learning Development

This is evaluated by a panel of 3 experts. The evaluation criteria are based on a rubric score for the quality of the research work, with the following levels: Level 3: High, Level 2: Moderate, Level 1: Low.

Results of Data Analysis

The researcher presents the results of the experimental implementation of the model and the data analysis as follows:

Table 1 Evaluation Results of Research Knowledge for Learning Development of Student Teachers Before, During, and After the Implementation of the Model (N=35)

Time Period	x̄	S.D.
Before the Implementation	5.057	1.235
During the Implementation	7.285	1.016
After the Implementation	11.828	1.484

From Table 1, it can be observed that the average scores for the research knowledge for learning development competence of student teachers (out of 15 points) after the implementation of the model were higher than the scores during the implementation and before the implementation, with values of 11.828, 7.285, and 5.057, respectively.

Table 2 Results of Pairwise Comparison of Mean Differences from Repeated Measures of Research Knowledge Competence for Learning Development of Student Teachers

Time Period		Mean Difference (I-J)	Std. Error	Sig	95% Confidence Interval for Difference	
I	J				Lower Bound	Upper Bound
1	2	-2.229*	.169	<.001	-2.655	-1.802
	3	-6.771*	.275	<.001	-7.465	-6.078
2	1	2.229*	.169	<.001	1.802	2.655
	3	-4.543*	.270	<.001	-5.223	-3.863
3	1	6.771*	.275	<.001	6.078	7.465
	2	4.543*	.270	<.001	3.863	5.223

From Table 2, it can be seen that the post-test scores after the implementation of the model were significantly higher than the scores during the implementation and the pre-test scores, with statistical significance at the 0.05 level.

Table 3 Results of the Assessment of Research Skills for Learning Development of Student Teachers Before, During, and After Implementing the Model (N=35)

Items	Before		During		After	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Ability to define research problems	2.857	0.671	3.771	0.646	4.229	0.646
Ability to define research objective	2.914	0.752	3.800	0.584	4.171	0.664
Ability to search for information	3.114	0.822	4.000	0.728	4.343	0.539
Ability to manage learning through the development of innovations	2.743	0.791	3.800	0.797	4.114	0.530
Ability to manage learning using techniques and methods	2.857	0.753	3.714	0.622	4.171	0.618
Ability to define the scope of research	2.914	0.711	4.029	0.747	4.257	0.611
Ability to select samples for research	3.000	0.783	4.000	0.728	4.143	0.601
Ability to create and assess the quality of research instrument	2.800	0.752	3.571	0.850	4.200	0.632
Ability to select data collection methods	3.929	0.711	3.629	0.770	4.314	0.583
Ability to select appropriate statistical methods for research	2.857	0.751	3.657	0.802	4.114	0.631
Ability to use basic data analysis software programs	3.057	0.701	3.543	0.741	4.286	0.622
Ability to interpret data results	2.886	0.742	3.571	0.815	4.200	0.677
Ability to make a research proposal	2.771	0.798	3.743	0.741	4.257	0.611
Ability to do a research report	2.886	0.843	3.714	0.789	4.143	0.733
Ability to appropriately apply research findings	3.086	0.887	3.857	0.692	4.171	0.618
Total	2.931	0.759	3.760	0.746	4.208	0.618

From Table 3, it is found that the average score for research skills for learning development of the teacher training interns after implementing the model was higher than the scores during and before the implementation. The skills after and during the implementation were at a high level, while the skills before the implementation were at a moderate level. The average scores were 4.208, 3.760, and 2.931, respectively.

From Table 4, it was found that the research skills score after the trial use of the model was significantly higher than the score during and before the trial use of the model at the .05 level of statistical significance.

Table 4 Results of the Pairwise Comparison of Mean Differences from Repeated Measures of Research Skills for Learning Development of Student Teachers

Time Period		Mean Difference (I-J)	Std. Error	Sig	95% Confidence Interval for Difference	
I	J				Lower Bound	Upper Bound
1	2	-12.429*	1.973	<.001	-17.396	-7.461
	3	-19.143*	1.646	<.001	-23.287	-14.999
2	1	12.429*	1.973	<.001	7.461	17.396
	3	-6.714*	1.943	.004	-11.608	-1.821
3	1	19.143*	1.646	<.001	14.999	23.287
	2	6.714*	1.943	.004	1.821	11.608

Table 5 Results of the Assessment of Personal Characteristics in Research for Learning Development of Student Teachers Before, During, and After Implementing the Model (N=35)

Items	Before		During		After	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
You accept and respect the differences of learners	3.829	0.891	4.605	0.790	4.400	0.775
You can manage the learning process	3.400	0.604	3.947	0.804	3.686	0.832
You are interested in seeking new knowledge to conduct research for the development of learners	3.629	0.843	4.316	0.739	3.800	0.797

You are enthusiastic, attentive, and consistently follow up on research to develop learners	3.457	0.780	4.368	0.751	3.914	0.702
You are willing to make decisions based on data analysis to find the best solutions for addressing learners' learning challenges	3.343	0.725	4.079	0.587	3.771	0.910
You consistently improve your classroom research to enhance student learning and ensure the maximum development of learners	3.200	0.677	4.211	0.577	3.914	0.702
You feel that research aimed at enhancing student learning is an integral part of your regular work	3.514	0.702	4.289	0.611	3.829	0.747
You are open to listening to feedback and criticism and engage in collaborative learning with your fellow teachers	3.171	0.785	3.947	0.868	3.914	0.853
You are careful and thorough when disseminating research findings	3.629	0.843	4.684	0.471	4.286	0.750
You recognize the value and benefits gained from research	3.314	0.631	3.947	0.804	3.771	0.690
Total	3.449	0.769	4.239	0.747	3.929	0.800

From Table 5, the average score of the personal characteristics in research for learning development of student teachers after the trial use of the model is higher than the scores during and before the trial use of the model. The personal characteristics after and during the trial were at a high level, while the personal characteristics before the trial use of the model were at a medium level, with average scores of 4.208, 3.760, and 2.931, respectively.

Table 6 Results of the Pairwise Comparison of the Mean Differences from Repeated Measures of the Personal Characteristics of Research for Learning Development of Student Teachers

Time Period		Mean Difference (I-J)	Std. Error	Sig	95% Confidence Interval for Difference	
I	J				Lower Bound	Upper Bound
1	2	-7.657*	1.127	<.001	-10.496	-4.819
	3	-4.800*	1.292	.002	-8.055	-1.545
2	1	7.657*	1.127	<.001	4.819	10.496
	3	2.857	1.360	.129	-.567	6.281
3	1	4.800*	1.292	.002	1.545	8.055
	2	-2.857	1.360	.129	-6.281	.567

From Table 6, it can be observed that the personal characteristics scores after the implementation of the model are significantly higher than the scores before the implementation of the model at the .05 level of statistical significance.

From Table 7, it can be seen that the research evaluation of the student teachers who participated in the trial of the research competency development

model to enhance learning for student teachers was at a high level in all four areas: research methodology, value and benefits of the research, problems and objectives, and the quality of the research report. The average scores were 2.841, 2.835, 2.790, and 2.714, respectively.

Table 7 Results of the Research Evaluation of Student Teachers who Participated in the Trial of the Research Competency Development Model to Enhance Learning for Student Teachers (N=35)

Items	Results of the Evaluation		Level
	x̄	S.D.	
1. Research Problems and Objectives			
a. Title	2.857	0.352	High
b. Principles and Background	2.667	0.474	High
c. Concepts, Principles, Theories, and Research Framework	2.886	0.320	High
d. Research Objectives	2.752	0.434	High
Total	2.790	0.407	High
2. Research Methodology			
a. Research Design	2.705	0.458	High
b. Popular and Sample	2.829	0.379	High
c. Variable	2.943	0.233	High
d. Instrument	2.848	0.361	High
e. Data Collection	2.800	0.402	High
f. Data Analysis	2.971	0.167	High

g. Summary of Results, Discussion, and Recommendations	2.790	0.409	High
Total	2.841	0.366	High
3. The Value and Benefits of Research			
a. Knowledge	2.886	0.320	High
b. Practical Application	2.790	0.409	High
c. Academic Application	2.829	0.379	High
Total	2.835	0.372	High
4. The Quality of the Research Report	2.714	0.454	High

Research Results

The results of the development of research competency to enhance learning for student teachers at Nakhon Sawan Rajabhat University showed that the student teachers had higher competencies in research knowledge and research skills for enhancing learning after the trial of the model compared to during and before the trial, with statistically significant differences at the .05 level. Regarding personal characteristics, the scores after the trial were significantly higher than before the trial at the .05 level. However, the personal characteristics after the trial were not significantly higher than during the trial. The evaluation of the research work showed that its quality was at a high level.

Discussions

The results of the development of research competencies for enhancing learning in student teachers at Nakhon Sawan Rajabhat University showed that the student teachers had significant improvements in their research knowledge and research skills for enhancing learning after the trial of the model. These competencies were significantly higher after the trial compared to during and before the trial at the 0.05 statistical significance level. This might be due to the learning management method used in the model, which involved a step-by-step learning process that included research content for enhancing learning. The self-learning aspect involved learning the research process by studying research reports independently, while knowledge exchange was based on discussions of research reports, and the practice involved creating research proposals. These strategies align with a research-based learning approach. These findings are consistent with those of Ketchatturat (2017), who studied the use of research-based teaching activities to develop graduate students' research abilities. The study found that students' research capabilities met the evaluation criteria in all dimensions, with high levels of research skills and research work quality. Similarly, Suwanno and Sintara (2018) studied the learning outcomes and research skills of fourth-year students at Yala Rajabhat University using research-based learning. The results showed that students' academic achievement in research methodology increased significantly. These findings also support research by Wessels et al. (2020), who studied the effectiveness of research-based learning (RBL) in higher education. The results indicated that RBL improved the research skills of students and helped solve problems effectively. Additionally, research by Marushkevych et al. (2022) focused on developing research competencies in students from the humanities field, using a new theoretical training model (lectures and seminars) integrated with research activities such as writing academic reports, presenting research, and teamwork. The study found that the experimental group showed significantly higher research competencies in knowledge, research skills, and motivation for professional activities compared to the control group. Furthermore, the research by Glazunova et al. (2019) showed that involving students in research, considering factors like intellectual levels, creativity, motivation, and self-esteem, played a critical role in developing their research competencies.

Regarding personal characteristics, after the trial, scores were significantly higher than before the trial at the 0.05 level, indicating a clear positive effect on personal characteristics development. Although there were no significant differences between the scores after the trial and during the trial, this might suggest that changes in personal characteristics stabilized after the trial period. This could be due to the short two-month period between the trial and post-trial phases, which may not have been sufficient to observe further changes. This finding aligns with research in psychology and personality development, which often compares pre- and post-

activity results, such as in self-confidence training or stress management. The "learning curve" concept suggests that development progresses rapidly at first but slows down after reaching a baseline, only to increase again after overcoming the plateau (Viering & Loog, 2023). Schunk and DiBenedetto (2020) also concluded that strategies like goal setting, positive reinforcement, self-regulation, and teamwork promotion could further enhance personal development and social skills.

Suggestions
Suggestions for Utilization The Research Results
Those who adopt the developed model must thoroughly study the background information and context of the students. It is essential to recognize that this development model is based on a learner-centered approach.

When implementing the developed model, it is important to establish a development plan that aligns with the needs of the content, the duration of the development activities, and the use of performance assessment tools for research competencies. This includes assessing knowledge, skills, and attitudes, which are crucial elements for designing activities in accordance with the model.

According to the research findings, personal characteristics after using the model were significantly higher than before, but with no statistical significance between the pre- and during-phase evaluations. To enhance the impact after the trial, the model may need to be improved to ensure continuity, or supplementary support should be added, such as follow-up activities, repeated training, or additional motivation after the program ends.

Development activities should take into account individual psychological characteristics, such as intellectual level, creativity, learning motivation, and high self-esteem, as these factors play a crucial role in the development of research competencies in students.

Suggestions for Future Research
Future studies should investigate the development of research competencies for enhancing learning up to the stage of presenting research findings to the public, such as through articles or presentations at conferences. This will ensure that student teachers develop well-rounded research competencies.

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