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The Development of a Model for Enhancing Research Competencies in the Classroom of Student Teachers

Oranut Srikham[1] & Yannapat Seehamongkon[2]

[1] Educational Research and Evaluation, Mahasarakham University,Thailand

[2] Department of Educational Research and Development, Mahasarakham University, Thailand

Correspondence: Oranut Srikham, Educational Research and Evaluation, Mahasarakham University, Thailand

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Abstract

The objectives of the study were to 1) analyze the components and indicators for enhancing classroom research competencies of student teachers, 2) study the needs of developing classroom research competencies of the student teachers, 3) to create a model for enhancing research competencies in the classroom, 4) apply the form of a model for enhancing research competencies in the classroom of student teachers and 5) evaluate the model for enhancing research competencies in the classroom. The sample group consisted of student teachers, mentors, and experts. The instruments used in the research were: 1) a questionnaire on current conditions and desirable conditions for developing research competencies in the classroom, 2) a questionnaire on the components and indicators of research competencies in the classroom of the student teachers, 3) an assessment form for appropriateness and possibility of the model, 4) research knowledge test, 5) assessment form for research practice, 6) research mind test and 7) assessment form for opinions towards the use of the model. Statistics used in data analysis were percentage, mean, standard deviation, and data analysis by Priority Needs Index Modified ($PNI_{modified}$) and Exploratory Factor Analysis (EFA). The results of the study were as follows:

1) Components and indicators of research competencies in the classroom of student teachers were classified into 3 components and 71 indicators as follows: Component 1: Cognitive, there were 24 indicators, the eigenvalue was 4.69; Component 2: Research practice, there were 30 indicators, the eigenvalue was 45.13; Component 3: research mind, there were 17 indicators, the eigenvalue was 1.91.

2) The results of the assessment of the needs of research competencies in the classroom of the student teachers by Priority Needs Index Modified ($PNI_{modified}$) revealed that the most needed competencies were cognitive (0.179), followed by research practice skills (0.178) and research mind (0.127), respectively.

3) The model for enhancing research competencies in the classroom of student teachers was conducted with the research practice of student teachers. There were 5 steps to develop according to the established method: self-awareness, motivation, intimation, learning, and evaluation.

4) The results of the experimental model of enhancing research competencies in the classroom of the student teachers revealed that they had a good understanding at 76.30%, and the overall classroom research practice was at a high level ($\overline{X}$ = 3.99, S.D. = .589), and the overall research mind was at a high level ($\overline{X}$ = 4.15, S.D. = .863).

5) The evaluation results of the model for enhancing research competencies in the classroom of the student teachers, overall were at a high level ($\overline{X}$ = 4.28, S.D. = .663).

Keywords: development, model, the development of a model, research competencies, student teachers

1. Introduction

Developing teachers with research competencies is the development of a learning management process that educational agencies pay attention to. Effective classroom research training is also an important form. Using the research process to integrate the learning process to encourage learners to acquire knowledge, realize, actually practiced, and use the media and a variety of learning resources. Teachers can organize a learning process that is suitable for students by using a research process in the classroom that solves problems in the classroom and uses the results to improve learning and teaching or encourage the learning development of learners to be better. This is to maximize the benefit of the students (Vongvanich, 2012).

Improving teacher education is one of the key education agendas to be undertaken by Southeast Asian countries, which the Southeast Asian Ministers of Education Organization (SEAMEO) has been leading from 2015 to 2035. Senior officials from the Ministry of Education in 11 countries recognize that schools today operate in an ever-changing and complex world of knowledge and information. It is the responsibility of teachers to equip students with the necessary and desired skills for the future. Consequently, teachers need continuous self-improvement. In order to improve their own work performance, this competency framework is used in 4 areas as a development framework, namely knowledge, skills, behaviors, and characteristics that can increase work efficiency even further. And one of the general competencies is the breadth and depth of knowledge acquisition that requires research-gained knowledge to develop oneself (The Teachers Council of Thailand, 2019). The development of research competencies of the student teachers must be managed for learners to get knowledge and understanding, research skills, a good research attitude, and the characteristics of a researcher for students to be born self-development. Therefore, the research process is a systematic for the research to be carried out according to the research objectives, which will help to obtain reliable research answers. In conducting research, researchers must systematically operate and follow the sequence of research steps. This will make it possible to research to achieve the goal of developing student learning successfully. Researchers should learn and have the skills to conduct research according to the research process to develop learning, to have guidelines for determining the research process to develop the learning process, and to be able to conduct research effectively (Ritcharoon, 2018).

In the context of universities and institutions related to teacher training in Thailand, giving learners knowledge and skills in classroom research is a must because it is the basic knowledge for those who will become teachers in the future, in which students will be involved in doing research. The learning management in the course for the learners will be in the form of a lecture, accompanied by activities and training for the learners to do research. And when practicing professional experience, students will use classroom action research to solve the problem (Vongvanich, 2017). After the study of student teachers (5-year curriculum), it was revealed that teaching competency in classroom research capability had most of the assessment results for each item at a low to moderate level. And in the overview, the ability to do research in the classroom was at a moderate level. When compared with all 8 competencies, it's revealed that the ability to do research in the classroom had the lowest average. Therefore, it is necessary to develop research competencies for student teachers (Sawatanan, 2008). Including a study of the needs of student teachers in the 3 southern border provinces, in Thailand. It's revealed that the need analysis of the student teachers expressed their opinions on the current conditions and desirable conditions by considering the need assessment on the highest value issue which is the appropriate time allocation for giving advice on conducting research in the classroom (Wadramae et al., 2018).

From the foregoing, it can be seen that in research competencies are important, which is the teacher's ability to perform their duties, which requires specialized knowledge and takes time as well as the academic principles underpinning such skills and methods. Therefore, to develop the efficiency of human resources to be competent and professional, student teachers must be a teacher who knows their roles in performing tasks related to teaching and learning management. They require knowledge, understanding, and competency, including understanding the ability to develop learning along with morality, communication, creating relationships and collaboration with others, planning for teaching and learning activities, supervision, monitoring and evaluation, reflection on performance for continuous improvement, and the use of research to adjust teaching techniques appropriately on the basis of information. The results of this research are indicative of abilities in various competencies for application in professional practice (Sinthuwong, 2007). Competency development mainly refers to the definition of David McClelland who compared the differences between high achievers in work and less successful people. It's revealed that what is divided between such people is competency, which includes knowledge, skills, and attitude/motivation. David McClelland divides competencies into two categories: 1) Threshold competencies are behaviors that arise from competence, knowledge, skills, and characteristics that are essential to work. Having this basic level of competency doesn't make individuals different from their colleagues in the organization; and 2) Differentiating competencies, including behavior resulting from the use of abilities, knowledge, skills, and advanced characteristics (values, motivation, and attitudes) that result in work success (Rassameethammachot, 2005). The development of research competencies of student teachers must be managed for learners to get knowledge and understanding, research skills, a good research attitude, and the characteristics of a researcher for students to develop themselves. Higher education management focuses on student-centered learning. Constructionism is a theory that emphasizes the learner as the creator of knowledge themselves. There is a basis for the process of knowledge creation. Learners can create their own knowledge. It is not only from the acknowledgment of the information by the instructor, but knowledge is derived from the interpretation of the knowledge and experience gained, and the learning process will be most efficient if the learners are in the real context and have fully played their role in learning (Khaemanee, 2014).

Based on the principles and reasons mentioned above, the researcher views research as an essential skill for developing the quality of student teachers. Therefore, there is an interest in developing a model for enhancing research competencies in the classroom of student teachers by using techniques to stimulate learners and upgrade their competencies so that they can carry out quality classroom research and achieve maximum efficiency, promote and develop research competencies in the classroom, develop the teaching and learning process for student teachers to get knowledge and competency ready to go out to perform as a teacher complete including being a guideline for applying to give advice on being a mentor's consultant in the future.

2. Literature Review

The development of this model for enhancing research competencies focused on giving learners understanding and practical skills for research in the classroom. The study of related documents found that learning management would make learners gain knowledge and skills, and learners should be encouraged to realize and have a good attitude toward research. In this study, I have created a theoretical framework and the concept of classroom research competency development from the concept of (Wannakham, 2010; Rungruengwanichkul, 2013; Chansiri, 2008; Duangpachan, 2018; Boyatzis, 1982; Davies, 1997; Shermon, 2004) have summarized the definition of competence as the ability to systematically acquire knowledge and apply it to the development of teaching and learning. The goal is to solve problems, improve student learning and improve teaching. Students have the competent in the research process, patience, carefulness and ethical researchers which consists of 3 components: 1) Cognitive means the ability of student teachers about the research process in the classroom, including research problem formulation, study of documents and related research, research variables and hypotheses, population and sample, data collection instruments and techniques, quality inspection of research instruments, basic statistical data analysis, and research paper writing, 2) Research practice skills means the ability of student teachers to do research in the classroom according to the research process consists of information research skills, knowledge seeking skills, analytical thinking, synthesis and evaluation skills used in classroom research to achieve goals and efficiency, and 3) Research mind refers to feelings towards research in the classroom, diligence, patience, responsibility, determination, faith in research, motivation, focus and purposefulness, inquisitiveness, detailed and systematically working, listening to others' academic opinions, honest and upright in academics, and having research ethics to develop research competencies in the classroom of student teachers. When the learner has already developed these characteristics, knowledge, and skills in research will be sustained.

The development of this model for enhancing research competency will focus on giving student teachers develop characteristics that promote classroom research. The researcher then created a model based on the theoretical concept of (Kanchanawasi, 2011; Temeeykul, 2009; Buasonth, 2007), which is a conceptual structure or model that simulates reality, elements, and relationships of various elements about the development of research competencies in the classroom of student teachers in order to strengthen the characteristics of classroom research to develop in a better way. It consists of 5 elements: 1) Self Awareness: learners must understand themselves, recognize their own abilities, and build their own confidence. 2) Motivation: using Wlodkowski's concept which are four conditional frameworks: building unity, developing attitudes, elevating meaning, realizing competencies, creating a learning atmosphere and bond between students and teachers, as well as creating an attitude to see the importance of learning that is consistent with their own needs. 3) Intimate: a process of mentor teachers' giving advice in the form of coaching to enhance the important competencies of current education by encouraging learners to develop their competencies and to create a Growth Mindset for self-improvement, and also the Professional Learning Community: PLC, which allows learners to critique operations and improve performance. 4) Learning: a process that causes changes in behavior and thinking caused by finding new things. The first step of creating self-knowledge starts from the issues that the learners are interested in, followed by the review and alternative thinking steps, and 5) Evaluation: Enhancing good and efficient research capacity, there should be evaluation results to verify the performance and feedback from the performance as information to improve the work.

3. Objectives of the Research

1) To analyze the components and indicators of research competencies in the classroom of student teachers.

2) To study the needs for the development of research competencies in the classroom of student teachers.

3) To create a model for enhancing research competencies in the classroom of student teachers.

4) To implement the model of enhancing research competencies in the classroom of student teachers.

5) To evaluate the form of enhancing research competencies in the classroom of student teachers.

4. Method

This was the development of research competencies in the classroom of student teachers, which was conducted by Research and Development with the scope of research divided into 4 phases as follows:

Phase 1: Studied the indicators and components of research competencies in the classroom from documents and related research and the need for developing research competencies in the classroom of student teachers. Quantitative data were collected from student teachers at universities in the northeastern region who were sample groups with questionnaires about current conditions and desired conditions of classroom research to analyze the needs of research competencies in the classroom of 674 student teachers by using a Priority Needs Index Modified ($PNI_{modified}$) and collected data for analyzing components and indicators of classroom research competencies of 854 student teachers using Exploratory Factor Analysis (EFA).

Phase 2: Created a model for enhancing research competencies in the classroom of student teachers. The information obtained in Phase 1 was used to draft a model for enhancing research competencies in the classroom of student teachers. The results of the synthesis and investigation of research competencies in the classroom revealed that there were 3 components: cognitive, research practice skills, and research mind. The quality of the model for enhancing research competency in the classroom of student teachers was inspected by 9 experts.

Phase 3: Tried out the model for enhancing research competency in the classroom of student teachers. This model was applied to the student teachers at Buriram Rajabhat University. The experimental period was 1 semester, totaling 35 students according to the components and steps of the model, namely, step 1: self-awareness, step 2: motivation, step 3: intimate, step 4: learning, and step 5: evaluation with coaching techniques and PLC process, collecting data on the results of using the model, consisting of 3 aspects: cognitive, research practice skills and research mind.

Phase 4 Evaluated the model for enhancing research competencies in the classroom from student teachers, mentors, and supervisors after trying out the model by studying opinions about the quality. The model for enhancing research competencies in the classroom consisted of 4 aspects: propriety, accuracy, utility, and feasibility.

4.1 Population and Sampling Procedures

1) Analyzed the need to develop research competencies in the classroom of 674 student teachers from 11 Rajabhat Universities in the Northeastern Region.

2) Analyzed the components and indicators of research competencies in the classroom of 854 student teachers from 11 Rajabhat Universities in the Northeastern Region.

3) Inspected the suitability and feasibility of the design, including various appraisal instruments by 9 experts.

4) Selected 35 student teachers at Buriram Rajabhat University, who were studying in the semester 2, the academic year 2021 by cluster random sampling, 35 mentors, and 5 supervisors.

4.2 Instruments

1) Questionnaire on current conditions and desirable conditions for research competencies in the classroom

2) Questionnaire on the components and indicators of research competencies in the classroom of student teachers

3) Model for enhancing research competencies in the classroom

4) Research Knowledge Test

5) Assessment form for research practice

6) Research mind test

7) Assessment form for opinions towards the use of the model for enhancing research competencies in the classroom of student teacher

4.3 Data Analysis

An analysis of quantitative data from questioning opinions of student teachers, and mentors by analyzing means and standard deviations. Data were analyzed by Priority Needs Index ($PNI_{modified}$) and exploratory factor analysis (EFA).

5. Results

The research results were divided into 4 parts as follows:

Part 1 The results of the study of indicators and components of research competencies in the classroom and the need for the development of research competencies in the classroom of student teachers.

1) According to the analysis of related documents and research let a group of experts consider and inspect the consistency and make a decision on the appropriateness and consistency of the indicators of research competencies in the classroom of student teachers. The investigation results found that the language was improved and the content was different from the synthesis of some issues of the document, by adjusting the cognitive aspect to be reduced to 24 indicators, research practice skills to be reduced to 30 indicators, and the research mind increased to 17 indicators.

2) An analysis of survey components and indicators of research competencies in the classroom of student teachers has inspected the preliminary agreement before conducting an exploratory component analysis for performance and indicators. Details were shown in Tables 1–2.

Table 1. Results of preliminary agreement inspection of exploratory component analysis using KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	**Bartlett's Test of Sphericity**		
	Chi-Square	**df**	**sig**
0.98	76819.75	2556	.000*

From Table 1, it was revealed that the Kaiser-Meyer-Olkin Measure of Sampling Adequacy had a value of 0.98, which was greater than the threshold of 0.50, indicating that this model was suitable for further analysis of the components. And when considering the correlation of the variables according to Bartlett's Test statistics, it was revealed that the variables were significantly related at the .05 level.

Table 2. Components and Eigenvalue of research competencies in the classroom from the exploratory factor analysis (EFA)

Classroom Research Competencies	**EigenValue**
Cognitive (24 indicators)	
Percentage of variance = 6.51	4.69
Cumulative percentage variance = 6.51	
Research Practice Skills (30 indicators)	
Percentage of variance = 62.68	45.13
Cumulative percentage variance = 69.19	
Research mind (17 indicators)	
Percentage of variance = 2.65	1.91
Cumulative percentage variance = 71.84	

From Table 2, it was revealed that the classroom research competencies of the student teachers could be classified into 3 components, 71 indicators. The first component was cognitive, there were 24 indicators, the Eigenvalue = 4.69, and the percentage of variance = 6.51. The second component was the research practice skills, there were 30 indicators, Eigenvalue = 45.13, and percentage variance = 62.68. The third component was the research mind, there were 17 indicators, Eigenvalue = 1.91, and percentage variance = 2.65.

3) The results of a study of the needs of research competencies in the classroom of the student teachers.

Table 3. A study of the need for research competencies in the classroom of student teachers

Research Competencies	**Current condition**		**Desire condition**		**$PNI_{modified}$**	**No**
	$\bar{x}$	**S.D.**	**$\bar{x}$**	**S.D.**		
Cognitive	3.37	0.71	3.98	0.83	0.179	1
Research Practice Skills	3.41	0.70	4.02	0.83	0.178	2
Research Mind	3.62	0.78	4.08	0.85	0.127	3

From Table 3, the results of the assessment of the needs of research competencies in the classroom of student teachers by using the Modified Priority Needs Index ($PNI_{modified}$) revealed that the competencies with the highest needs index were knowledge and understanding (0.179), research practice skills (0.178) and research mind (0.127), respectively.

Part 2 The results of creating a model for enhancing research competencies in the classroom of student teachers. The researcher has used the information obtained from this study to create a model to respond to the importance and needs of student teachers in developing a model that was appropriate and complete as illustrated in Figure 1.

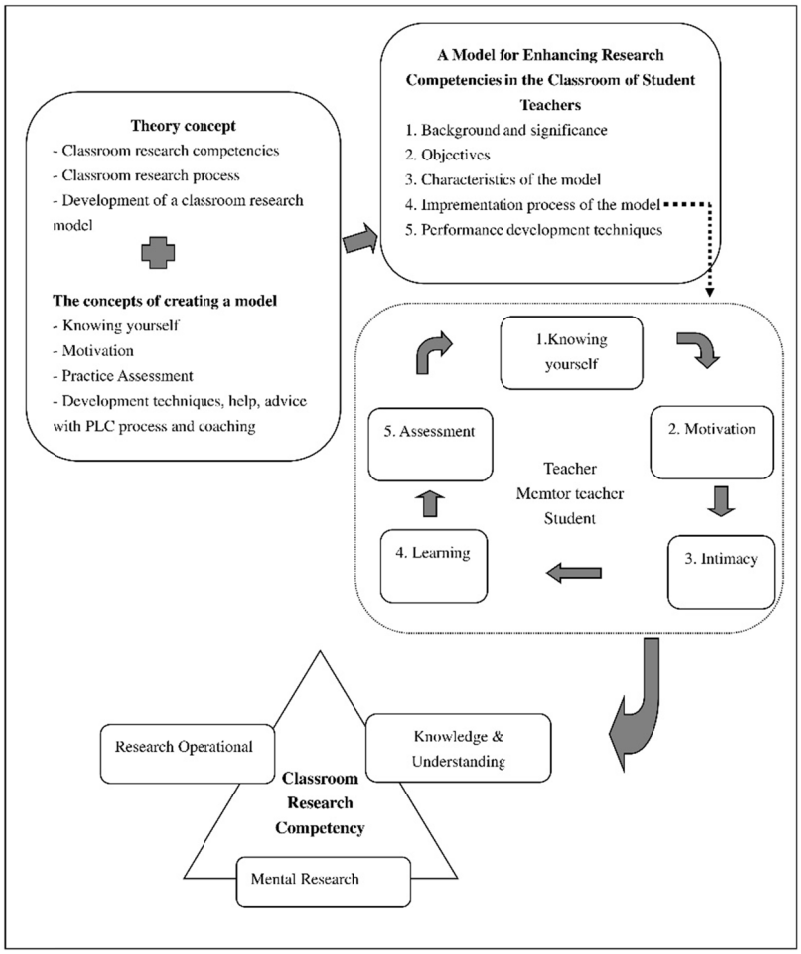

Figure 1. Model for the development of research competencies in the classroom of student teachers

Part 3 The results of trying out the model for enhancing research competency in the classroom. The researcher has divided the presentation into 3 aspects, namely cognitive, research practice skills, and research mind, details as follows:

1) Cognitive Assessment Results

Table 3. Results of the test of knowledge and comprehension of classroom research of student teachers

Cognitive assessment	Number	Score	$\bar{x}$	S.D.	Percentage	Result
experimental group	35	30	22.89	1.23	76.30	Good

From Table 3, it was revealed that student teachers who used the model for enhancing research competencies in the classroom compared to the classroom research competencies with 70–79 percent assessment criterion. It revealed that they had knowledge and understanding at the level of Good (76.30%).

2) The results of the assessment of research practice skills in the classroom revealed that the overall level was at a high level ($\bar{X}$ = 3.99, S.D. = .589). When separating each aspect, it was revealed that the highest evaluation aspect was the research hypothesis ($\bar{X}$ = 4.21, S.D. = .537), while the lowest evaluation aspect was discussion and recommendations ($\bar{X}$ = 3.67, S.D. = .540).

3) The evaluation results of the research mind revealed that the overall score was at a high level ($\bar{X}$ = 4.15, S.D.

= .863). When considering the highest mean aspect, research work has made you more knowledgeable and broad-minded ($\bar{X}$ = 4.34, S.D. = .802). In contrast, the lowest mean aspect, conducting research is an important mission in the performance of teachers' duties. Research is a necessity that student teachers should do along with teaching practice, and conducting research is worth the time because it could be put to benefit ($\bar{X}$ = 3.97, S.D. = .923).

Part 4 Assessment results of the model for enhancing research competencies in the classroom of student teachers, the overall score was at a high level ($\bar{X}$ = 4.28, S.D. = .663). When separated by aspect, it was revealed that the highest mean aspect was accuracy ($\bar{X}$ = 4.31, S.D. = .698), followed by usefulness ($\bar{X}$ = 4.30, S.D. = .665), and possibility (X = 4.26, S.D. = .734), respectively.

6. Discussion

According to the results of the research on the model development for enhancing research competencies in the classroom, there were important issues to be discussed as follows.

1) In the study of components and performance indicators of this research, the researcher chose a research competency study method by synthesizing academic papers and research papers related to research competencies and inspecting the consistency with respect to competency and performance indicators by experts. The research competencies in the classroom were the ability to seek knowledge systematically with the goal of solving problems, and developing learners' learning corresponded to (Wongyai & Pattaphol, 2019) said that competency was the ability to do something correctly according to the specified criteria using knowledge, understanding, and skills and characteristics that were inherent in and consistent with (Davies, 1997) and Shermon (2004) said that the research competencies were divided into 3 components: cognitive, research practice skills and research mind, consistent with (Nawakitpaitoon, 2018), said that research competency consisted of 3 sub-competencies: cognitive, attitude, and researcher characteristics.

2) Current conditions and desirable conditions for enhancing research competencies in the classroom of student teachers revealed the results of the needs assessment of research competencies in the classroom of student teachers. The most demanding performance was cognitive which was the result of a person who would have competency in various fields, must arise from knowledge and understanding in that matter in order to be applied to work in various areas (Vongvanich, 2017), said that the characteristics that promote a person to be knowledge, skills, and ongoing classroom action research were many factors: having knowledge, understanding, and confidence, or being confident to do research consistent with (Kesang, Khamyang, Buddhasen, & Kesang, 2019) revealed that competency in research was the priority same as (Paiwittayasiritham & Ponphanthin, 2016).

3) A model for enhancing research competencies in the classroom of a student teacher used as a narrative medium to illustrate the concept of (Keeves, 1988) was to provide a framework for constructing a model for enhancing research competencies in the classroom by brainstorming expert opinions, and operating with the research work of student teachers. There were 5 stages in development:

① Self-awareness was understanding yourself, and acceptance of reality corresponded to (Soprano & Yang, 2013), studied about doing case study research with a science student teacher to find in-depth information about the results of action research during the internship. Learning management through Inquiry-Based Learning and self-confidence of students, it was revealed that students had developed more understanding and had more confidence in their own teaching.

② Motivation was the creation of readiness in attitude to see the importance and value of what was learned, one's own needs, attentiveness, and responsibility in accordance with (Wlodkorski, 1985) said that motivation was a teaching process that encouraged learners to want to learn, and made the learners feel good about what they have learned or practiced.

③ Intimacy was a process of giving advice by a mentor who was a coaching teaching system that was an opportunity to see each other's performance. The coaching supervision technique would create a good relationship between the coach and coachee in line with the (Wongyai & Pattaphol, 2019) said that coaching guidelines enhance competencies. Teachers used coaching for students to develop competencies in various areas.

④ Learning was a process that caused people to change their behavior and thoughts. People could be learned by hearing, reading, and using technology arising from the experience of the interaction between teachers and students which created an atmosphere that was conducive to learning in accordance with (Kowtrakul, 2009), said that learning was the process that caused changes in human behavior and thinking arising from self-searching for new things.

⑤ Evaluation was to check the results of the research in the classroom whether it met the goals or objectives to

what extent within the specified period, to reflect on the results of the practice to get information to improve the development of the work better. Miller (2001) said that the quality of action research in classrooms could be considered in many issues such as problem identification, problem-solving methods, etc. Srisaard (2010) said that research evaluation was a guideline for conducting research to obtain quality research results according to the principles of good research.

4) Using the model for enhancing the research competencies in the classroom of the student teachers revealed that they had knowledge and understanding at a good level, which knowledge was important in carrying out various activities because it was a process that caused the behavioral change. In terms of research operations in the classroom, the overall score was at a high level because students have actually practiced and a mentor who gave advice closely according to the process of using the model, consistent with (Poonphuttha, 2019) it was revealed that research competencies of post-graduate students had higher research competencies to study at a high level. According to the research mind, the overall score was at a high level, which would affect the research to achieve expectations.

5) Evaluation results of the model for enhancing research competencies in the classroom of student teachers revealed that the overall score of the model was at a high level, which could be seen as a form of enhancing research competencies in the classroom. It had a clear, actionable process, could solve problems in the classroom, use the results of research to improve teaching and learning, and promote and develop student learning.

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