

Chapter 5

Conclusion, Discussion, and Recommendations

The research on critical thinking teaching competency development using teachers' collaborative learning and action research approaches of the teachers in The Prince Royal's College was aimed at 1) to construct the handbook to enhance knowledge and understanding on critical thinking for the collaborative learning of the teachers, 2) to study the effect of using the handbook on the teachers' competence on analyzing the learning strand contents that facilitated critical thinking, setting up the instructional plans to enhance critical thinking, implementing the plans, and on the student's critical thinking behavior developed as the result of using the instructional plans, 3) analyze the problems and obstacles on the teachers' instruction to teach critical thinking, and, 4) to propose guidelines for the development of lower-secondary school teachers' competence on teaching critical thinking. The population for the research included 27 teachers from the 5 learning strands, and 544 Mathayom Suka 1 students enrolled in the 1st semester of 2012 academic year at The Prince Royal's College. The sample included 15 teachers who taught in the 5 learning strands who volunteered for the study. Three teachers were selected from each of the 5 learning strands, namely, Thai language, mathematics, science, social studies, religion, and culture, and English language. The sample also included 5 heads of the learning strands and 119 students – 39 from Mathayom Suka 1/7, 40 from Mathayom Suka 1.8, and 40 from Mathayom Suka 1/9 all of the classes which were taught by the 15 teachers.

The research instruments included handbook on enhancing knowledge and understanding on critical thinking for the collaborative learning. The questionnaire asking the congruence between the learning strand contents and critical thinking for the collaborative learning, and the form for evaluating the instruction that facilitated the critical thinking by the teachers, and the form for observing the classroom process and the student's behavior, and the form to reflect on the instruction that facilitated the critical thinking. The data collected were to be analyzed in terms of percentage, mean, and standard deviation.

Research Conclusion

1. The results of using the handbook to enhance knowledge and understanding on critical thinking for collaborative learning among Mathayom Suka 1 teachers using collaborative learning and action research approaches were presented in the aspects of:

1.1 The teacher's competence in analyzing the learning strand contents that facilitated the critical thinking teaching, instruction planning, and implementing the instructional plans collaboratively prepared by all the involved teachers in the 5 learning strands: It was found that, in general, their competence was at very appropriate level. The 5 learning strand teachers were competent in examining the details, standards, indicators, and the content to design the tasks and assignments inserted in with the thinking standards and characteristics that facilitated critical

thinking and could implement the instructional plans collaboratively developed to facilitate the students to practice critical thinking. The teachers were also able to solve the problems occurred during the instruction and revised the plans to be relevant to the context of the class with careful, thorough, and reasonable considerations.

1.2 Concerning the developed critical thinking behavior of the students, it was found that, in general, the students had shown their critical thinking behavior at very much level. When comparing the behaviors after the engagement in the 1st, 2nd, and 3rd instructions, it was found that the means of their developed behavior increased from one instruction to another.

2. Problems, obstacles, and solutions on the teachers' instruction for critical thinking, it was found that at knowledge and understanding developing phase, the teachers did not have clear knowledge and understanding on the thinking standards and characteristics that facilitated critical thinking and the competence on analytical thinking, synthetic thinking, decision making, and problem solving of each teacher varied. The collaborative learning helped enhance their knowledge and understanding on each type of thinking.

During the phase of analyzing the appropriateness and congruence of the insertion of critical thinking teaching in the strand contents, the teachers did not well integrate the thinking standards, characteristics that facilitated critical thinking and instructional activities. The collaborative learning approach had facilitated the teachers to learn and could better design the activities to be relevant to the learning objectives.

During the phase of instructional design, the teachers were concerned solely with the activities along the strand content more than building up the characteristics that facilitated critical thinking. Many teachers were unable to set up the tasks or assignments to help the learners to practice the skill critical thinking in a various and integrative ways. Their designed instructional activities were not suitable to the class time (1 hour). The attempts to solve the problems and the learning exchange among the teachers of the learning strand on the organization of the learning activities to be congruent to the thinking standards and characteristics that facilitated had enabled the teachers to better design the assignments.

During the phase of implementing the instructional plans, some teachers had lacked the skills of classroom and time management, action research, and collaborative learning. The teachers had reflected on the setting up of instructional activities and classroom management and suggested the school's academic division to adjust the time tables of the teachers in the same learning strand to have free time at the same time at least 2 times a week. Consequently, the teachers had learned from friends on the problems and were able to better manage the classroom.

3. The process of teacher's critical thinking teaching competency development had started from the study on the principles, theories, and researches on critical thinking, thinking standards, characteristics that facilitated critical thinking, and collaborative learning and action research approaches. After that the handbook on enhancing knowledge and understanding on critical thinking teaching was created before being used to develop the competence on critical thinking of the teachers. Learning units 1-3 were focused on collaborative learning with the uses of variety of techniques, namely, Think-Pair-Share, Round Robin, Buzz Groups, Talking Chips, Three-Step Interview, Team Matrix and Peer Editing. Learning units 4-6 employed

action research along with the collaborative learning approaches in which the teachers had chance in collaboratively set up the instructional plans. Afterward, each teacher implemented the plans while colleagues from the same learning strand observed and collected the information to reflect on the implementation later on. Then, basing on the reflections, they collaboratively set up the instructional plans from the next cycle until they finished the 3rd cycle. In the 4th cycle, they used the reflections at the end of the 3rd cycle to write up the instructional plan for the 4th cycle. Having gone through the cycles, the 5 learning strand teachers and learning strand heads collectively reflected on the implementation of the instructional plans. They then concluded the results of the instructional plan implementation, the developed behavior of the students, and problems, obstacles, and methods of instructional revision.

Discussion

The results of the research on critical thinking teaching competency development using collaborative learning and action research of the teachers in The Prince Royal's College could be discusses as follows:

1. The Competence of the Teachers in Analyzing the Learning Strand Content and Setting Up the Instructional Plans to Enhance Critical Thinking

In the first phase which was on analyzing the learning strand content that facilitated the insertion of thinking standards and characteristics that facilitated critical thinking to set up the learning unit, it was found that the teachers in the 5 learning strand were not yet able to link the thinking standards and characteristics that facilitated critical thinking to instructional activities in a relevant way. This was because the teachers had individually created the learning units without any learning exchange. In the meeting among the teachers of the same learning strand, through the collaborative learning process as suggested in the handbook, working on learning units 1-3 which opened for the teachers to collectively reflect and mobilize ideas to carefully and reasonably examine to come up with the integration of the learning strand contents and thinking standards leading to the design of instructional activities. The collaborative learning had resulted the teachers' better knowledge and understanding and were able to analyze the learning strand content and create the learning units that facilitated critical thinking. Following the handbook by carrying out the activities in learning units 1-3 had stimulated the teachers to look for variety of options through the process of setting up the hypothesis, identifying the information sources, concluding the explanations, and realizing the perspective on the issue under investigation. In finding the evidences, the questions used in the group were of the "why." The teachers practiced raising questions on the thing unknown or unclear or requiring explanation. They were to additionally explain the thing under discussion. The process trained them to be open-minded for opinions, perspectives, reasons, and evidences of the others before exchanging ideas among them. The situation was set up to stimulate the critical thinking, e.g. requiring the teachers to write down the ideas and reasons to support them and be critical to what they had written to find false with to encourage the teachers to come up with a more relevant answer. Then the group concluded the lessons learned to facilitate the teachers in collaboratively construct the criteria for judging the answer. They linked it to the process above to come up with a situation where each teacher was paired with another, then switching to another. The process should encouraged the teachers to

carefully, critically, and reasonably think about things linking to the learning standards, indicators, and learning strand content that suited the thinking standards and characteristics that facilitated critical thinking leading to the setting up of the next learning unit. The process was also suggested by Paul (2006) who proposed the method for self-training to become a critical thinker focusing on reasoning and thinking standards, identifying the meaning and significance in the components of the things being read or written. The analysis covered the issues of goals, questions, perspectives, hypothesis, inference, facts and information, conclusion or deduction, and concept. The main points focused by Paul was the use of thinking while examining all these components and self-regulation to be critical on the things being thought of.

The finding that the teachers collectively setting up thinking standards and characteristics that facilitated critical thinking was congruent to the learning standards and the learning strand content at very appropriate level shows that teachers had knowledge and understanding on thinking standards and the characteristics that facilitated critical thinking. They could link the learning strand content along the learning standards and indicators in a congruent and appropriate ways. The teachers in the 5 learning strands had inserted the thinking standards on accuracy the most, followed by the clarity, and logicalness. The teachers had realized the significance of the accuracy of the content of the subject. They focused on the access to the information on the content that existed, was understandable, non-confusing nor ambiguous, and could integrate the ideas gained from considering on the learning strand content to support knowledge and understanding on reasonable basis. Concerning the characteristics that facilitated critical thinking, it was found that teachers in the 5 learning strand had inserted the attempt to examine the evidences the most, followed by Perseverance and determination to find the reasons. These were because the teachers placed emphasis on the careful search for the answers by which the students should examine the reliability of the information before making decision. Concerning the finding revealing that the teachers had minimally inserted the awareness of one's own knowledge and capacity onto their instructional plan, it would have been because teachers mainly focused on training the students to use the thinking standards in analyzing the learning strand contents which required many of them such as accuracy, clarity, relevance, significance, adequacy (depth and width of the information), logicalness, and fairness. Before the students could be aware of their own capacity, they had to know how to use thinking standards as the framework to regulate their own thinking and practice it until it become their habit. This was also pointed out by Chareonwongsak, Kriengsak (2006) who suggested that the development of the criticizing habit started from criticizing one's own thinking, opening mind to listen to the others' opinion, being careful not to jump to conclude, being reasonable not to selectively take only the information he/she interested in, without bias, having knowledge searching skills to respond to their doubts, and having no bias against the change. These habits could have been caused by the teachers' learning resulted from engaging in the learning units 4 and 5 in the handbook to train the teachers to use thinking standards. Such critical thinking facilitating characteristics had been formed in the teachers too. It had equipped the teachers with analytical thinking (logicalness), synthetic thinking (ability to connect and construct new things basing on reasoning), decision making (Careful examining and reviewing),

and, Problem Solving (Choosing a reasonable way of problem solving) which were well applied in the training situations inducing the teachers the approaches in inserting thinking standards and characteristics that facilitated critical thinking onto their instructions. This was used in designing the activities for the students to practice until they became their habits. The process was also suggested by Ennis (1985); Huot (1998); Watson and Glaser (1964); and Case (1994), who similarly contended that the person with critical thinking ability would be able to critically analyze and synthesize, critically examine the reliability of the information, and make decision on critical basis.

It was also found that the teachers were able to set up the instruction that enhanced critical thinking which, in general, was rated at very appropriate level and increased along the instructional plan implements. This would have been the consequence of the collaborative learning that assured the teachers being helped and supported through exchanging ideas facilitating the teachers in perceiving and adopting perspectives to adjust and modify their own thinking. The teachers had collaboratively learned to think carefully and critically, basing on reasoning and reliability of the information enabling them to set up the tasks and assignments to effectively enhance critical thinking. In early phases of instructional planning, it was found that the teachers solely focused on organizing the activities basing on the contents of the subject than on forming the characteristics that facilitated critical thinking. Another problem was the teachers' setting up the instructional activities unsuitable to the time. At that stage, many teachers had not yet been able to prescribe the tasks and assignments that could facilitate the learners in practicing the critical thinking skills in various and interconnecting ways. After the meeting through collaborative learning which were the activities set for learning units 4 – 5 of the handbook that contained the steps in developing knowledge and understanding on critical thinking via the collaborative learning approach coming up with 6 steps, the teachers could be more able to set up their instructional plans. This shows that the collaborative learning approach could facilitate the teachers in developing the instruction to achieve the goals set. Moreover, the teachers and heads of the learning strands had rated the activity plans to open for the learners to think critically in group at the most appropriate level. The teachers would have realized that the in-group critical thinking group practice would have enabled the students to present their ideas to their friends in the group for them to discuss and express opinions which might be the same for different making them open-minded and reasonable to listen to the opinion of the others, becoming interested in the different perspectives, dared to think and act out, all of which were the crucial characteristics that facilitated the students to become critical thinkers. The participation in the learning exchange among the teachers in the same learning strand had led the teachers to open their perspective and be interested in the different ones. They were open-minded to listen to the reasons of one another enable them to design the tasks and assignments and plan the instructional activities for the students. The teachers had acquired the habit of attempting to examine the evidences, reviewing, considering logicalness of the information, connect what they had known and the newly acquired knowledge and conclude as theirs, dare to think and act out, open-minded and accept and interested in the perspectives of other people. All these characteristics were also observed by Johnson and Johnson (1986); Myers (1991), and Anuradha (1995) who had similarly concluded that the collaborative

learning was the process that ensured higher achievement than learning alone. It facilitated the participants to derive the issues and exchange ideas, criticizing things. They had direct response to one another, were responsible to their own learning and learned to identify the answers to the problems encountered.

2. Teachers' Competence in Enhancing the Students' Critical Thinking Behavior

It was found in this research that the students' behaviors, in general, were at very appropriate level. The students had critically and carefully reviewed, and identified the logicalness before making decision. This was because during the instruction, the teachers had used questions to guide the students to the main issues of the things being learned. They left enough time for the students to think and did not rush them for the answer. The teachers encouraged the students to examine and think thoroughly, consider the information reliability, checking the reasoning of their own tentative answer before sharing it with their friends in the group whose members collaboratively mobilized the ideas to get at the options and reasonable conclusion. From the observation, the teachers opened the opportunity for the students to express their ideas in diverse ways making the students interested and active in taking part in the activities and responsible for their own and the group learning. They learned to use the information to support their decision on reasonable basis. They learned to accept ideas of other classmates and modified their own thinking if it had been wrong. They reviewed and carefully thought before making any decision and were determined to find the reasons to support the decision in a reasonable way. They did not jump to conclude and dared to think and act out. They could relevantly conclude the issues and became interested in the perspectives that differed from their own and accepted the reasons proposed by friends. The instruction that focused on critical thinking had facilitated the students to analyze themselves, carefully think, and be able to connect and build up new ideas including the problem solving in a reasonable way. These findings are agreeable with the ideas of Lorsuwannakool, Wijitporn (2005) who had pointed to the training for students to think individually as an instructional step to implant critical thinking skills onto the students. Each student practiced thinking, interpretation, analysis, inferential conclusion, assessing arguments, explaining, self-regulating, and thinking freely facilitated by the teacher who would provide additional explanation. When students raised questions, the teachers would give them enough time to get the answer of their own by posing some stimulating questions. They observed the student behavior and reinforced when they got the right responses.

The teachers' ability to organize the instructional activities to enhance the students' critical thinking indicated that the teachers had had knowledge and understanding to analyze the learning strand contents and set up the instructional plans that successfully facilitated critical thinking. Another explanation was the use of action research that opened for the teachers to collaboratively think, plan, implement, observe, collect information, view VDO of the teacher's teaching, and reflect on it. The process followed the 3 cycles of action research. The reflection at the end of the cycle would be used to revise the plan for the next cycle. In the reflection, the teachers had realized the weaknesses and strengths enabling them to be more competent in organizing the instructional activities that effectively enhanced the

critical thinking as also noted by Bassey (1986); McTaggart (1990); McCutcheon and Jurg (1990); Zuber-Skerritt (1996); Saenthawee, Bancha (2002); Punyapinyophol, Kittiporn (2006) and Traimongkolkool, Phongphan (2010). According to the authors, action research was the approach to improve the performance by initiating change and learned from the change. The process was initiated voluntarily by the performer who had recognized the significance of the development of his/her own operation and continuously on the cycles starting from planning, acting on the plans, observing the performance, and reflecting on the results. The cycle went on until the task was improved to the point needed. The process required cooperation from the concerned individuals. In this research, the cycle went on for three times. The teachers and learning strand heads collectively reflect at the end of each cycle and used the ideas to improve the plan. The ability to have carried out the process showed that the teachers had knowledge and understanding and could better analyzed the contents that facilitated critical thinking. When they returned to review the content at the end of the first cycle, they could review, criticize, consider logicalness, link to the thinking standards and characteristics that facilitated critical thinking and came up with the revised instructional plan to assure the clarity, precision, linkage, and logicalness of the learning activities, thinking standards, and characteristics that facilitated critical thinking.

3. Readiness for the Instructional Planning on Part of The Prince Royal's College

The Prince Royal's College is a large school having many teachers in each learning strand. At each grade, there were many teachers conducting the instruction. They did not teach at many grades at the same time. Having tight teaching load, they had less opportunity to join the training or seminar set by the concerned agencies. When the action research program was adopted, they considered it the opportunity for self-development. They then volunteered to take part in the program in the number sufficient for the program operation. The support by the School administrators was also a crucial factor. Such support came in form of the policy to encourage the teachers to develop themselves, the provision of convenience for the teachers to conduct the activities, setting up the time schedule to facilitate the teachers in each learning strand to be free at the same time to exchange their learning, helping one another in constructing the teaching materials, administrators' supervision, following-up, providing assistance, setting up the forums for experience exchange, provide budget supports for organizing the activities, and providing moral supports to the teachers to engage in self-development. All these were crucial for the teacher competency development via collaborative learning and action research approaches. In collaborative learning in which the teachers who were free from teaching responsibility at the scheduled time had collaboratively reflected, planned, implemented the plans, observed the implementation, used the results of the plan implementation to reflect on the plans and set up the plan for the next cycle. The teachers' perseverance on self-development and supports from the School administrators had led the collaborative learning and action research approaches to develop the teachers' critical thinking teaching competence to successfully achieve the goals set.

Recommendations

The results of this research could be used for by many sides concerned as follows:

1. Recommendation for Applying the Research Results

Recommendations for the School Administrators in General

1) The administrators of the schools should encourage the teachers apply the critical thinking teaching process utilizing collaborative learning and action research approaches for organizing instructional activities with continuous and systematic supervision and follow-up to assure the effective operation.

2) The school administrators should facilitate the instruction to enhance the students' critical thinking using collaborative learning and action research by arranging the time table for the teachers in the same learning strand to have the same non-teaching periods to assure their getting together to plan the instructions and collectively reflect on them.

3) The school administrators should set up the school policy for the development of basic, intermediate, and advanced levels of thinking for the teachers in the school to facilitate the teacher critical thinking teaching.

Recommendations for the Teachers

1) The teachers should insert critical thinking in every subject on continuous basis to implant the student's good thinking habit.

2) The teachers should analyze each of the learning units and identify the thinking standards and characteristics of the students to ultimately become the critical thinker.

3) In preparing the instructional steps for the students' learning, the teachers should come up with a table to map the activity with the students' thinking competence – which thinking standards and characteristics of the critical thinking should a particular instructional activity achieve.

4) The teachers should use the questions to stimulate the student's critical thinking and give them enough time for deriving the answer, not to quickly conclude nor answer it but let the students exchange learning and provide moral supports to the students.

2. Recommendation for Further Researches

1) There should be a research on the model of the teacher's critical thinking teacher competence development utilizing collaborative learning and action research approaches in other learning strands.

2) There be a research on the competence of the teachers in teaching other types of thinking such as analytical thinking, synthetic thinking, problem solving, creativity, etc., employing collaborative learning and action research approaches to enable the teachers in teaching thinking.

3) There should be an assessment of the thinking competence of teachers by using the form to assess the critical thinking before and after the thinking competence of the teachers.

4) There should be a research on the effect of thinking standards and characteristics that facilitated critical thinking using the form that specified the indicators of the behavior in using thinking standards and characteristics that facilitated critical thinking.