

Chapter 5

Conclusion, Discussion and Recommendation

The research on science teaching profession development on learning management to promote scientific thinking of Mathayom Suksa 3 studpkoents using lesson study was aimed at 1) developing the learning provision to promote scientific thinking skills of Mathasom Suksa 3 students, 2) studying the roles of the school administrators, teachers, and students in the process of learning provision using lesson study, and, 3) studying the opinions of the school administrators and teachers on the teaching profession development focusing on learning provision using lesson study.

The findings are as follows

This teaching profession development was a collaborative developing and school-based effort using variety of development process starting from setting up readiness for the development. Focus group was used for the school administrators and science strand teachers to reflect on the results of the learning management conducted so far to build up the awareness on the problems concerning science learning management and set up the goals leading to the collaborative process of science learning development. The main goal was to promote the student's scientific thinking skill. All participants had agreed that there was a need for the teaching profession development on learning management that was relevant to the problems and the learning goals set. After they derived the conclusion on the main issues to be developed, the workshop for learning management was organized to promote student's scientific thinking skill facilitated by the resource persons who had expertise to build up understanding and practicing on learning management planning to assure the teacher's knowledge and understanding and ability to design the learning management activities to promote the student's scientific thinking skill. After that they helped one another to look for a teaching profession development model through various media and documents concerning teaching profession development and had derived the process of

the teaching profession development which was the lesson study process. Consequently, there had to be a process to prepare readiness before applying the lesson study. Everyone had studied from the media and documents to build up preliminary understanding on it. They also study toured at the schools that had successfully implemented the lesson study process. Afterward, there was a training session to create clear understanding on the lesson study facilitated by the resource persons who had expertise on it before implementing the lesson study process in their school.

In carrying out the teaching profession development along the lesson study process at Jae Hom Wittaya School, in second semester, 2011 academic year, three steps of the lesson study were planned. These are step 1 – learning management planning, step 2 – implementing the plans in the classroom, and, step 3 – reflection and conclusion. Basing on observation and note taking, the researcher had found that the school administrators, teachers, and students had behavioral change on group working. All of them now had participated in the planning and carrying out the activities on regular basis. Along the lesson study process, the participants had eventually changed their behavior. Both of the school administrators had played crucial roles in facilitating and supporting with media and equipment for learning management, and, places and facilities for carrying out the activities for the teachers. If there were some problems or things needed to be taken care of, they would recommend to and guide the teachers on solving them. The facilitative process had enhanced the teacher's motivation and provided moral support for them.

Besides behavioral changes on part of the school administrators, the teachers had shown their behavioral change in learning management using lesson study process. They had turned to work together more to set up the learning management plans by studying the documents and set up the scenarios and media to be used in organizing the learning activities each week. The process had led to the mutual working network in which they could work together and help one another. During implementing the learning management plans in the classroom, everyone would come in to observe the class and record the student's learning behaviors and used the notes to reflect on the results of learning activities having been carried out to increase the effectiveness of the learning management plans on sustainable basis. One effect of the teacher's learning management plan development was the role change on part of the students in learning

along the scientific process. After the teacher had explained and had them practice on their own learning activities each week, the students had got together in examining the information or the scenarios assigned by the teacher. They had engaged in the discussion, analysis, and problem identification to lead to the hypothesis setting and learning activities designed to test the hypothesis through the procedure commonly set. Then they concluded on the findings and presented the group's work. The student's behavioral change had eventually taken place and become clear the most in the learning units 4 & 5 in which the students had expressed their learning along the steps of the scientific process and had gained efficacy in carrying out the learning activities and presenting their work with pride.

After operating on the teaching profession development using lesson study process continuously along every step, the researcher had asked opinion of the school administrators and the teachers on the results of science teaching profession development carried out so far. The results were as follows:

The participation in every step of the lesson study on part of the school administrators had led to the significant change on roles of the school administrators in learning management from the one who simply approved the learning activities to the supporter and the facilitator who helped solve the occurring problem along the learning management process of the teachers relevant to the problem and authentic conditions of the school. This could also be applied to other subjects as well.

While developing the learning management process, particularly on the plan setting, the teachers had worked together in setting up the plans, searching for learning resources, media, and equipment for carrying out the learning activities. This teacher's behavior had differed from what was before which they had solely worked out the plans and implemented them alone. The new process had increased the effectiveness of the learning management process. Now they had working network in which the teachers could collaborate in setting up the learning plans and help solve the problems occurring on weekly basis. They had gained confidence in organizing the learning activities for the students as the activities were carried out through the thinking and planning processes of the group of teachers and the outcomes were later on approved by the school administrators. The teachers were fully motivated in developing the learning

management as they were taken care of and well supported both by school administrators and the colleague teachers along the whole process of the operation.

The new process of learning management had opened opportunity for the students to think and put into practice by themselves enabling them to dare to express opinion and to present their work with confidence. Moreover, the learning activities developed through lesson study process could facilitate the student to acquire scientific thinking skills, set up the plans, and take action along the systematic procedural steps, listen to opinion of others, and use the information and reasoning to support their decision making.

This research on teaching profession development focusing on learning management to promote scientific thinking of the students using lesson study process had shown the role change on part of the individuals in every target group, namely, school administrators, teachers, and students. The change that clearly and constantly occurred was the teacher's changing to mutually working particularly at the planning step in which everyone would help find the media, learning resources, and documents to present and discuss on, to the point everyone considered the most appropriate guaranteeing the best effectiveness of the learning management plans to be implemented each week. The outcome was the team work and working team to facilitate and support the teacher's operation on various aspects on continuous basis resulting the true school-based teaching profession development.

5.2 Discussion

The discussion on the research science teaching profession development covers the following issues, namely, 1) readiness preparation for the science teaching profession development, 2) the teaching profession development using lesson study process, 3) crucial roles of the actors concerning the science teaching profession development on learning management, and, 4) the changes occurred as the results of using lesson study process for teaching profession development. The details are as follows:

Concerning the readiness for teaching profession development, there were some meetings for setting up the readiness for the profession development in which the participants had worked together in reflecting on the problems and setting up the

mutual goals for the development. There were discussion and consultation making everyone aware and had part in the profession development. They had gained knowledge and understanding on the development process to guide their operation on continuous basis through variety of processes including focus group, studying the concerned documents and media, workshops, and study tour at the school successfully implementing the program to become clear on the process of profession development before deciding to apply it in their school.

From such readiness preparation for teaching profession development mentioned above, it is apparent that any teaching profession development could never be accomplished nor sustained by using a general model or process. The process or model had to be selected to fit the context and real need of the participants. Everyone had to realize the significance of the development and lend hands to collectively carry out every steps of it on continuous basis. Similar point was also made by the U.S. Department of Education (2004:18) which contended that the profession development had to cover variety of activities including knowledge provision, skill training, putting into practice, and improving the classroom. Thus, it is necessary be developed through the collaboration of all truly concerned individuals. It was a school-based process as suggested by Phosrithong, Polsan (2003) who contended that in accomplishing the school-based teaching profession development, there was a need for paradigm shift on every concerned individual. The process had to build up understanding and collaboration to push forward the development toward the expected goal using mutual learning process.

The teaching profession development using lesson study had been continuously carried out in the 2nd semester of 2011 academic year. From the observation and note taking on the behavior of the school administrators and the teachers, it was found the school administrators and the teachers had eventually developed their own roles. Though they had come to clearly understand and had certainty about the lesson study process, at the step of getting set for the operation, the sustainable teaching profession development could not be actualized simply by the training or various forms of development. There was a need to constantly practice to continuously improve and develop inducing determination and collaboration on part of every concerned individual. They need to take part in the activities every time at the time scheduled. It

could be because of this development process that everyone had taken part in every step of it which was initiated because of the problem and need for science learning management of the school. It was also the product of care taking on part of the school administrators and strengthening team work of the teachers who helped and listened to one another's opinion leading the success of the teaching profession development. The process was a good model of a school-based development program. Similar principle was also cited by Sanrattana,Wirot (2001), and Maunchat (1997) who proposed the concept on teaching profession development contending that the profession development had to be started with identifying needs and necessity of self-development. It was the development basing on direct learning experience of the one who was to be developed. It had to be the development organized for the teachers and school personnel to satisfy their need relevant to the context of the school under the close supervision of the school administrators and every concerned individuals to lead to a sustainable profession development.

Concerning the role taking in the teaching profession development, from the observation and note taking on behavior of the school administrators, teachers, and students along the period of the lesson study operation, it was found that every one of them had eventually change his/her role. The interesting role was that of the school administrators which facilitated and provided supports by constantly checking the needs of the teachers every week. If some problems or what should be improved were found during their engaging in the activities, the administrators would ask for the details of the problem and express idea to and guide the teachers how to solve the problem. Besides, in every week, school administrators would reflect on the results of the operation occurring through the lesson study process. They also concluded the results of the operation on weekly basis and regularly expressed their appreciation on the determination of every teacher. Such behavior had provided reinforcement and moral supports for the teachers making them more confident and able to carry out the operation continuously for the whole semester.

As the school administrators had supported the activity engagement of the teachers and had continuously taken part in the activities at every step including their appreciation on the works done by the teachers, everyone had determined to collaborate in developing the learning management, planning, preparing the media and equipment,

and helped reflect on what had been done. They had added up to one another. The supports and regular participation of the school administrators had shown their confidence in using the lesson study process for the teaching profession development. They had responded to the questions and recommendations raised by the participants of the lesson opening activities. This was also found by Inprasitha, Naurmol (2009) who stated that the support by the school administrators was the factor leading to the success in using lesson study in the teaching profession development.

Concerning the teacher's roles in the lesson study, the researcher had observed the behavior clearly reflecting the collaboration and team work the process of which had made the teachers change their behavior in managing the student's learning. They were more confident and able to set up the learning plans and implement them in the classroom leading to the achievement of the goals along the indicators set. They were clear on the process of learning management as lesson study was the process encouraging every teacher to participate in setting up the learning management plans. There was a team work in which every teacher had worked together to think and find the innovative media, plan, and solve the problem occurred. Everyone who had collaboratively planned the learning management could successfully implement such plans. This was the case in weeks 13 and 14, when the teacher who was supposed to teach had become sick and could not do it. Other teachers who had helped set up the plans could be able to replace her in doing the effective job. This was also noted by Laurel and Ann (2006) who insisted that the collaboration among the research-participating teachers was a success of the science teaching profession development assuring the teacher's certainty about the learning management for the students. This was also observed by Inprasitha, Maitree (2009) Triwaranyu, Charinee (2007), and Nimitarapan, Attasart (2010) who contended that the lesson study process could enhance the teacher's understanding and confidence on organizing the instruction in their own classroom. They would also regularly improve the methods and approach for providing instruction. Every time, there would be their colleague teachers coming in to observe and later on collectively reflect on the results of the instruction which was a crucial factor of the lesson study. That is the collaboration.

Another obvious change on science teaching profession development was that the teachers had modified the learning management making it differ from the previous

ones in which the teachers would prescribe the experiment questions and procedural steps for the students to do. In the new learning plans, the teacher had used the scenario to stimulate the student's interest, opened the opportunity for the students to think about the question raising, designed the experiment, and put into practice through the method or procedural steps set by the group along the 4 scientific steps, namely, identifying problem, setting up the hypothesis, and interpreting and concluding. The students had discussed together to conclude the question, set up the hypothesis, designed the experiment to test the hypothesis, and implemented the plans to find the conclusions of each group. This was the learning through the processes of thinking and practicing by oneself along a procedure in a systematic way. This would be clearly seen in the learning managing plan used in the lesson opening activities in which every teacher had presented the scenario to stimulate the student's interest in variety of ways. After they had discussed and found the conclusion on the scenario to be used, they would encourage one another to anticipate the student's answer for each of the questions in the scenario set up. The results of this anticipation would equip the teachers with clearer framework and direction for classroom observation. Each week, the teachers would work on the finding or problem occurring to improve and set up the role and method for learning management along the 5 step of knowledge inquiry suggested by the Office of the Basic Education Commission (2007), particularly on the part that encouraged the students to work together to examine things, providing time for the students to think about what they had doubted as well as to solve the problems. Along all these steps, the teachers would serve as the adviser for students to assure their learning by themselves. It was the learning activity organization that opened for the students to enquire for knowledge at all 4 levels as proposed by Bell and Randy (2008), and, Abrams (2008). The focus was mostly on level 3 - guided inquiry, and level 4 - open inquiry. Through these levels, the teacher would assign a scenario and then open opportunity for the students to identify the problem, set up hypothesis, design the experiment to test the hypothesis, and examine and conclude their experiment. At all these steps, the teacher would provide advice and encourage the students to work together to carry out the learning activities. The teacher would also encourage students to identify the issue of their interest and organize learning activities through science project on biodiversity.

The efforts on parts of the school administrators and the teachers who had developed the learning management by using the scenario to stimulate the students, had opened the opportunity for the students to set up the questions, design the experiment, and put into practice all the activities by themselves making them eventually change their learning behavior. From the observation and note taking on learning behavior and the reflection of the classroom observers, it was found that, at the beginning, the students had not much taken the role as much as they should, particularly those on planning on and designing the learning activities and their method of learning. Most of them would wait for the teachers to order and were anxious when there was a classroom observer standing close to observe them. After the lesson study process had gone on for some time, the teachers had revised and developed the learning management plan by opening more opportunity for students to think on planning and carry out the activities by themselves. This was clearly seen in the learning units 4 – 5 which facilitated the students to develop the skills on scientific thinking on continuous and procedural bases. They had to think in identifying the problem when the teachers had assigned the scenarios for them to examine, analyze, and discuss to identify the problem and reach the conclusion on key questions on the scenario assigned by the teacher. They had to think to set up the hypothesis which followed after they had clearly identified the questions and collected facts concerning the problem, and analyzed and synthesized the information before set up the testable hypothesis. Afterward, they had to think how to test the derived hypothesis. When students had clear hypothesis and could identify the main variables to find the answer, they would set up the plan to test the hypothesis and design the experiment by themselves as well as to set up the model of presentation relevant to the acquired information, concepts for information interpretation, and conclusion. After the students had obtained the information from carrying out the activities, they would work together to interpret the information which had been linked on cause and effect relationship leading the conclusion of the experiment results along the objectives set.

After the teachers had adjusted the student's learning management model by opening opportunity for them to think to plan their learning and put into practice themselves enabling them to express the behavior of systematic thinking. They helped one another in identifying the problems or issues on which they had doubted before

designing the group's experiment. Then they proceeded it step by step and collected information and concluded it to finally present the result with pride. This was truly the case particularly on science project which students had come up with the topic of their interest, and worked out the project as having been set by their group. In presenting the results, if there were some issues concluded differently from those of other groups, they would come back to discuss among their group-mates to compare their work with that of other groups and adjusted to make it more complete showing the scientific thinking skill along scientific model and thinking system. They worked together in analyzing the scenario, identifying the issues to be studied, setting up the hypothesis, designing the experiment, testing the hypothesis, and concluding and presenting the results of their experiment. All these were done along a procedure on reasoning basis. Similar finding was also found in the research conducted by Inprasitha, Maitree (2007) who found that the learning management through lesson study had helped acquire effective learning management plan facilitating the student's development on thinking skills and it took time to have their learning behavior changed as they needed time for adjusting themselves to and accepting the new learning model. After they had understood and could carry out the learning activities, they began to show the behavior of systematic thinking along the process set by them leading the eventually clearer scientific thinking skills.

In the process of teaching profession development along the lesson study carried out this time, besides the supports and advices for improving the process or solving the problems occurring provided by the school administrators, there was also an internal supervision while carrying out the lesson study. The researcher who is also a superintendent had been responsible in developing the science subject learning management of the Officer of Secondary Education Service Area 35 which is also the office under which she has been affiliated. She had taken part in the activities and provided advices to the teachers along the whole period of the lesson study particularly at the steps of learning management planning in which most teachers would raise questions and asked for opinion from the researcher every time they needed help. All these had made them confident in putting the learning management plan into practice in the classroom in which the researcher would come in and observe as well as note down the points. Later on, she would reflect on the observation in the reflective forum to

collectively improve the learning management plans to assure and sustain their effectiveness for the time to come. This has shown that the collaboration with the external experts could lead to the awareness on the significance of role changing for more effective learning management to the point they were confident that the lesson study was the opportunity for the developing the profession, acquiring the experience in working together, and creating and maintaining the operational network. This was similarly found by Inprasitha, Maitree, et al. (2007) who found that the lesson had led to the creation of a network and internal supervision as everyone had worked together in setting up the learning management plans and implementing them in the classroom, observing the class, reflecting on the things having been observed, helping one another in solving the problem, providing advices, and guiding how to improve the action that occurred at every step of the lesson study. This had reflected the team work supervised by the superintendents, school administrators, and the colleague teachers who all had helped facilitate the learning activity organization occurring during the process of learning management within the school.

5.3 Recommendations

1. Recommendations for applying the research results

1.1 There should be the process of building up mutual understanding on the lesson study process by working together to find the appropriate model that fits the context of the school to assure every actor's clear understanding before actually implementing in in her or his school.

1.2 There should be the effort to build up awareness on the significance of the lesson study and competency of every concerned side to enable their application of every step of it to best fit the context and needs of each school.

1.3 In carrying out the teaching profession development using lesson study process, besides the workshop and study tour, the concerned individuals should put the principles and plans into practice on continuous basis strictly basing on collaboration.

1.4 There should be an effort of using lesson study process to guide the school's internal supervision aiming at developing the learning management collaborated by the school administrators and the teachers from the steps of planning to

implementing them, and classroom observation and reflection on the learning to assure the sustainable process of the development.

2. Recommendations for further researches

2.1 In planning on the learning management, the teachers should guess the student's answers or methods of knowledge inquiry to assure the clear direction and goals of the observation in the process of classroom observation.

2.2 The concerned individuals should implement the lesson study process at the beginning of the 1st semester at the first grade of the grade level such as Mathayom Suksa 1 not at Mathayom Suksa 3 in teaching mathematics as the latter ones have studied through learning activities on other models and might stick with such traditional model. It would take a long time to change their learning behavior.

2.3 There should be longer time for collecting information than in this research to be assured that the results of the development were the effect of the continuous and sustainable process of teaching profession development.

2.4 The concerned individuals should try the lesson study process with other learning strands to develop the teacher's learning management basing on the collaboration of the colleague teachers, school administrators, and others.