CHAPTER 3

Research Methodology

For research methodology, researcher developed a curriculum following Taba's model (1962 cited in Ornstein, C. A. & Hunkins, P. F., 2009) combined with the applying of lesson study approach which consisted of 3 stages; 1) collaboration in research lesson design, 2) collaboration in the research lesson observation, and 3) collaboration in reflection or post-discussion. The framework could be schematized as below:

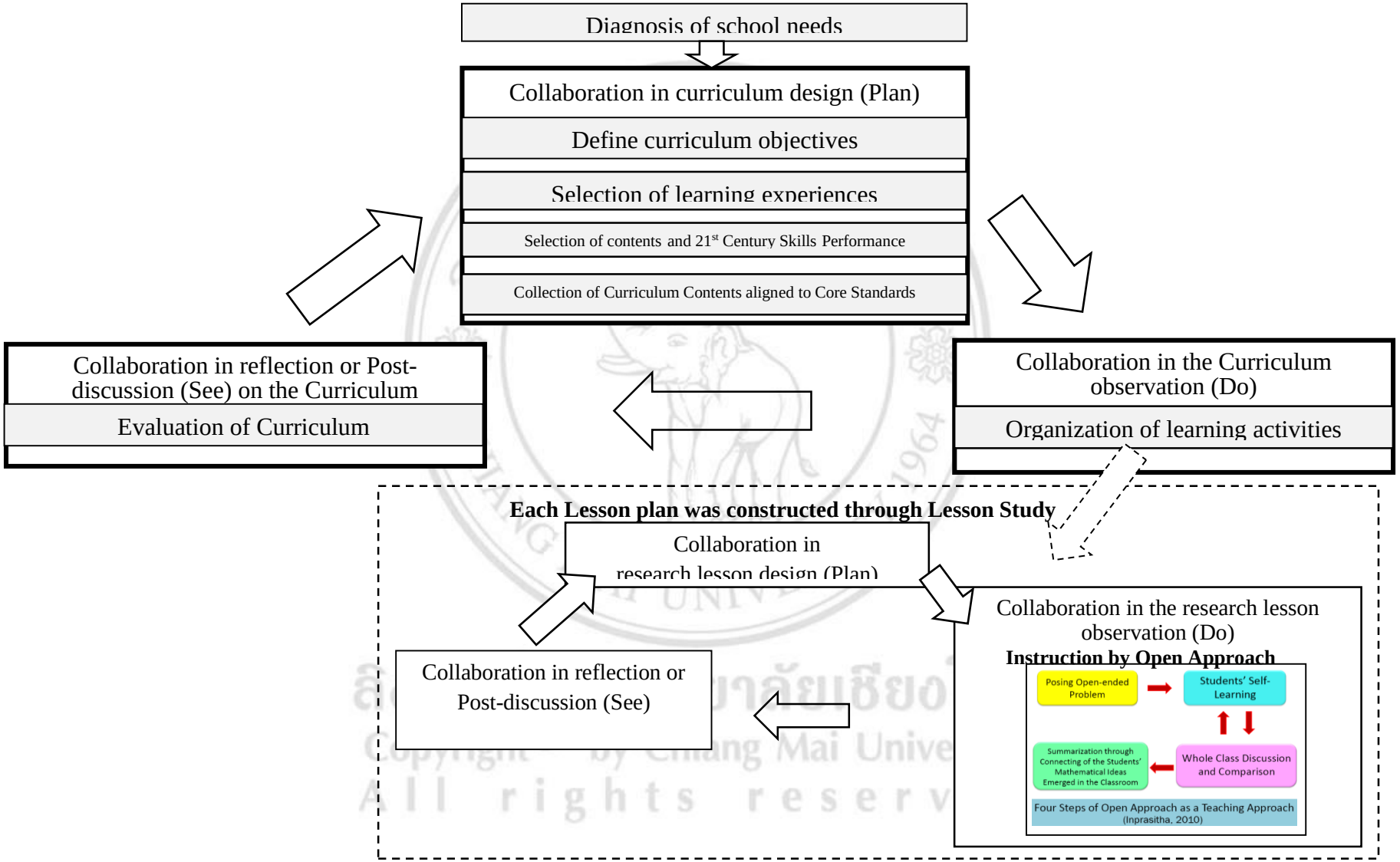

Figure 3.1 illustrates the framework in this research applying Lesson Study Process

3.1 Target group of the Research

The target group covers the following:

3.11 Participants in the process of developing the Mathematics curriculum to promote Learning and Innovation Skills of 21st Century through the Application of Lesson Study, school s including Academic vice Director, Chief of Academics Affairs, Chief of Research and Human Resources Development, Chief of Curriculum and Instruction, Mathematics Department Chair, and 8 mathematics teachers.

3.12 Participants who used Mathematics curriculum to promote Learning and Innovation Skills of 21st Century were mathematics teachers of Wiengjedee Wittaya School.

3.2 Research instruments

The research instruments that the researcher has produced can be divided into two types and covers the following:

3.2.1 Research instruments in the processes of developing Mathematics curriculum to promote Learning and Innovation Skills of 21st Century through the Application of Lesson Study were focus group meeting minutes and videotapes.

3.2.2 Research instruments to analyse the results of using Mathematics curriculum to promote Learning and Innovation Skills of 21st Century were the 21st Century skills performance observation form, videotapes, audiotapes, and field notes of the researcher.

3.3 Creating and checking the quality of the research instruments used in the research

The implementations of this part cover the following:

3.3.1 The research instruments used for developing Mathematics curriculum to promote Learning and Innovation Skills of 21st Century through the Application

of Lesson Study was the focus group meeting minutes. These were the processes following this step;

1) A draft of meeting agenda.

2) Set issues, pertaining to the curriculum development, for discussion in each meeting. The issues were included in the meeting agenda such as concepts and principles of the curriculum, features of activity for learning and teaching, content, appropriation of time, and ideas for indications of behaviors/characteristics that showed the 4C's. In each meeting, a video tape should be recorded.

3.3.2 The research instruments to analyse the results of using Mathematics curriculum to promote Learning and Innovation Skills of 21st Century was the 21st Century skills performance observation form. These are the processes following this step;

1) Reviewed the theories and related literature on the 21st Century Skills such as Framework of the Partnership for 21st Century Skills, enGauge 21st Century Skills of NCREL and Metiri Group.

2) Conducted focus group with mathematics teachers to identify the 21st century skills performance of learning and innovation skills; (1) critical thinking and problem solving, (2) creativity and innovation, (3) communication, and (4) collaboration, or 4C's. The teachers watched the video of a Thai teacher deliver a math lesson via open approach method in topic of Volume.

3) After participants watched the video, the teachers worked collaboratively to identify essential math learning behaviors, which emphasized learning and innovation skills for the 21st century.

4) Created the 21st century skills performance observation form by using the identification form 3) and by using structured observation.

Indications in accord with 4 learning skills and innovation should be specified for observer to record the behaviors in classroom as shown in appendix B, page no. 151-152.

5) The researcher as a teacher to teach students in the class, the rest of the participants collaboratively took turns to observe the instruction (Unit1). The participants used the form to record the student learning behaviors.

6) After class finished in Unit1, participants met to reflect the lesson with the topic; objectives, expected learning behavior, and asked if the observation form that really observes the 21st century skills performance or not. Discussion together and developed new observation form. Changed the form following open approach processes; Posing Open-ended Problem, Students' Self-Learning, Whole Class Discussion and Comparison, and Summarization through Connecting of the Students' Mathematical Ideals Emerged in the Classroom as shown in appendix B, page no. 153.

7) The participants took the observation form from 6) to observe in the class in Unit 2-14. The participants met to reflect the form of observation that still difficult to identify 4C's. After that all agreed to change the form of observation in the 2nd time. Topic to be changed was divided into 3 columns. The first column was the four steps of open approach; step 1) presentation of state of open-ended problem, 2) self-learning process of learners, 3) discussion and comparison among peers in the class, 4) summary of lessons learned concluded from ideas and comments raised by students. The second column was a record of behaviors observed in the class. The last column was a record of behaviors and characteristics which show the learning skills and innovation (review along with the list of indications described in another sheet). Once the observation form was revised, it would be used to

observe the rest of the lessons in the learning plan. An example of revised observation form was shown in appendix B, page no.154-156.

8) The participants took the observation form from 7) observe in the class.

To make it clearer, the researcher will present the tools that are used in every step of this research and the participants who related to each tool in the following table 3.1

Table 3.1 the process of research methodology

Processes	Activities	Participants	Research instruments
Diagnosis of School needs			
Focus groups meet three times The 1st meeting, researcher meets with the Mathematics Department Chair.	Researcher and participants discuss about; 1. Analysis of school problems and mathematics learning in the past. 2. State of problems in teaching Mathematical skills.	• Mathematics Department Chair • Chief of Curriculum and Instruction • Researcher	• Focus group meeting minutes • Videotapes
The 2nd meeting, researcher meets with Academic vice director.	Researcher and participants discuss about; 1. The policy of the nation and school pertaining to World-class standard school. 2. What the school needs to do to improve students.	• Academic vice Director • Researcher	• Focus group meeting minutes • Videotapes

Table 3.1 (cont.)

Processes	Activities	Participants	Research instruments
The 3rd meeting, researcher conducts focus group with school executives.	Researcher and participants discuss; 1. The policy of the nation and school pertaining to World-class standard school. 2. What the school needs to do to improve students. 3. Preparing teachers for classes in the 21st century. 4. Researcher presents a method of how to develop the mathematics curriculum which can be consistent with the school's policy.	• Academic vice Director • Chief of Academics Affairs • Chief of Research and Human Resources Development • Chief of Curriculum and Instruction • Researcher	• Focus group meeting minutes • Videotapes

Table 3.1 (cont.)

Processes	Activities	Participants	Research instruments
Appling Lesson Study in curriculum development			
1.Collaboration in curriculum design: Plan			
1.1 Define curriculum objectives Focus groups meet two times The 1st meeting, researcher meets with school executives and mathematics teachers.	1. Researcher presents the 21st Century Skills, the policy of the nation and school's needs, and lesson study processes. 2. To ask participants to be volunteers for curriculum development.	• Academic vice Director • Chief of Academics Affairs • Chief of Research and Human Resources Development • Chief of Curriculum and Instruction • Mathematics Department Chair • Eight mathematics teachers • Researcher	• Focus group meeting minutes • Videotapes

Table 3.1 (cont.)

Processes	Activities	Participants	Research instruments
The 2nd meeting, researcher meets with school executives.	1. To discuss about definition of curriculum objectives that align with Basic Education Core Curriculum B.E. 2551 (A.D. 2008) and 21st Century skills.	• Chief of Curriculum and Instruction • Chief of Research and Human Resources Development • Chief of Academics Affairs	• Focus group meeting minutes • Videotapes
	2. Participants discuss about the concept/principle, subject description, and expected results/curriculum objectives.	• Mathematics Department Chair • Researcher	

Table 3.1 (cont.)

Processes	Activities	Participants	Research instruments
1.2 Selection of Learning experiences Focus groups meet one time with school executives and mathematics teachers.	1. To review method of using the Lesson Study process. 2. Researcher presents a sample video lesson showing the Open Approach of Japanese teachers so that they can see the whole process of a lesson which encourages students to think, communicate, and collaborate	• Chief of Academics Affairs • Chief of Research and Human Resources Development • Chief of Curriculum and Instruction • Mathematics Department Chair • Eight mathematics teachers • Researcher	• Focus group meeting minutes • Videotapes

Table 3.1 (cont.)

Processes	Activities	Participants	Research instruments
1.3 Selection of content and identification of the 21st century skills performance factors Focus groups meet two times The 1st meeting, researcher meets with school executives and mathematics teachers.	Selection of content 1. To discuss about the contents in fundamental mathematics grade 7 that align with Basic Core Standards 2008 and accord with the 21st Century skills. 2. To make lesson unit / name of each unit and timing of hours of each topic.	• Chief of Academics Affairs • Chief of Research and Human Resources Development • Chief of Curriculum and Instruction • Mathematics Department Chair • Eight mathematics teachers • Researcher	• Focus group meeting minutes • Videotapes
The 2nd meeting, researcher meets with Chief of Curriculum and Instruction and four Mathematics teachers.	Identify the 21st Century Skills Performance factors 1. Researcher presents the instruction by using Open Approach via a video of a Thai teacher.	• Chief of Curriculum and Instruction • Four mathematics teachers • Researcher	

Table 3.1 (cont.)

Processes	Activities	Participants	Research instruments
	2. Participants collaborate to identify the 21st Century Skills based on their observations on the video and create the framework for student's evaluation for 21st Century Skills Performance.		
1.4 Collection of Curriculum Contents that align to Core Standards	1. Researcher and participants collaboratively to create curriculum structure, identify the unit of learning name, name of each study plan.	• Chief of Curriculum and Instruction • Four mathematics teachers • Researcher	• Focus group meeting minutes • Videotapes

Table 3.1 (cont.)

Processes	Activities	Participants	Research instruments
2. Collaboration in the Curriculum observation: Do			
2.1 Organization of Learning Activities by using Open Approach and the application of Lesson Study	<u>1. Collaboration in research lesson design: Plan</u> - Collabortively design the lesson plans to follow curriculum structure. - The participants discuss the name of each lesson plan, Mathematical purpose, Learning and Innovation skills, Open-ended problems, activity instructions, questions for assessment in each lesson, and the assessment. - Create Lesson Plan. - Construct 21st Century skills performance observation form.	• Eight Mathematics teachers • Researcher	• Focus group meeting minutes • Videotapes

Table 3.1 (cont.)

Processes	Activities	Participants	Research instruments
	2. Collaboration in the research lesson observation: Do - Researcher as a teacher teaches students following the lesson plan. - Collaboratively observe the lessons of the 21st Century skills Performance in the class.	• Mathematics teachers • Researcher	• 21st Century skills performance standards observation form • Videotapes • Audiotapes • Reseaecher field notes
	3. Collaboration in reflection or Post-discussion: See - Discuss and reflect about the success of each lesson plan regarding knowledge and the 21st Century skills. - Discuss and reflect about students' Mathematical ideals found in the Class	• Chief of Academic Affairs • Chief of Research and Human Resources Development • Chief of Curriculum and Instruction	• 21st Century skills performance standards observation form • Videotapes • Audiotapes • Reseaecher field notes

Table 3.1 (cont.)

Processes	Activities	Participants	Research instruments
	.	• Mathematics Department Chair • Eight mathematics teachers • Researcher	
3. Collaboration in reflection or Post-discussion on the Curriculum: See			
3.1 Evaluation of Curriculum	- Evaluate process of the curriculum development through the application of Lesson Study - Discuss advantages/limits/problems/ obstacles which occurred during the development process as well as the participants' opinions.	• Academic vice Director • Chief of Academic Affairs • Chief of Research and Human Resources Development • Chief of Curriculum and Instruction	• Focus group meeting minutes • Videotapes

Table 3.1 (cont.)

Processes	Activities	Participants	Research instruments
		• Mathematics Department Chair • Eight mathematics teachers • Researcher	

3.4 Data Collection

Process of data collection as follows:

3.4.1 Asking permission from Academic vice Director of Wiengjedee Wittaya School to do the collaborative curriculum development using the Lesson Study process.

3.4.2 Doing focus group with five school executives; Academic vice Director, Chief of Academics Affairs, Chief of Research and Human Resources Development, Chief of Curriculum and Instruction, Mathematics Department Chair to analyze school's problems and needs.

3.4.3 After the discussion about curriculum objectives, researcher uses Taba's model (Taba, 1962 cited in Ornstein, C. A. & Hunkins, P. F., 2009) together with the process of Lesson Study (Inprasitha, 2010) to develop curriculum, three steps are set; collaboration in curriculum design, collaboration in curriculum observation, and collaboration in reflection or post-discussion on the curriculum. For each lesson plan researcher applied lesson study. Three steps are described in details as follows:

1) Collaboration in curriculum design. This step consists of determination of curriculum objectives, selection of learning experiences, selection of contents, the 21st century skills performance, and collection of curriculum contents aligned to core standards.

2) Collaboration in curriculum observation by organizing learning activities using open approach and lesson study to develop 17 lessons, making a total of 32 teaching hours. After construction of the curriculum, participants agree to have researcher as a teacher and a collaboratively defined observer for each lesson. During observation in the class, the observer will use the 21st century skills performance observation form, videotapes, audiotapes, and reseacher field notes. After the class, the researcher will take note on focus group meeting minutes and prepare for reflection in the next step.

3) Collaboration in reflection or post-discussion on the curriculum. A focus group with school executives and mathematics teachers will be

held to reflect/discuss about the whole process of the curriculum development. Researcher collects data and uses videotapes, audiotapes, and reseacher field notes.

3.5 Data Analysis

Data will be analyzed by objectives and characteristics of data as follows:

3.5.1 To develop Mathematics curriculum to promote Learning and Innovation Skills of the 21st Century through the Application of Lesson Study.

1) Qualitative analysis: Data from observations, field motes, meeting minutes, tape scripts were analyzed and finally made summarization. Data were presented in descriptive writing discussing the overview of process for the curriculum development as well as elements of the curriculum.

2) Quantitative analysis: Data were analyzed and presented in form of frequency and percentage. For the evaluation of curriculum by participants, the curriculum should gain more than or equal to 70 per cent approval.

3.5.2 To study the results of using Mathematics curriculum to promote Learning and Innovation Skills of the 21st Century through the Application of Lesson Study. Learning skills and innovation (4C's) will be analyzed data from the 21st century skills performance observation form, videotapes, audiotapes, and reseacher field notes. Afterward data were presented in the tables as shown in appendix B.