APPENDIX A

Manual for Evaluation of the Lower Secondary School Mathematics Teacher Competency

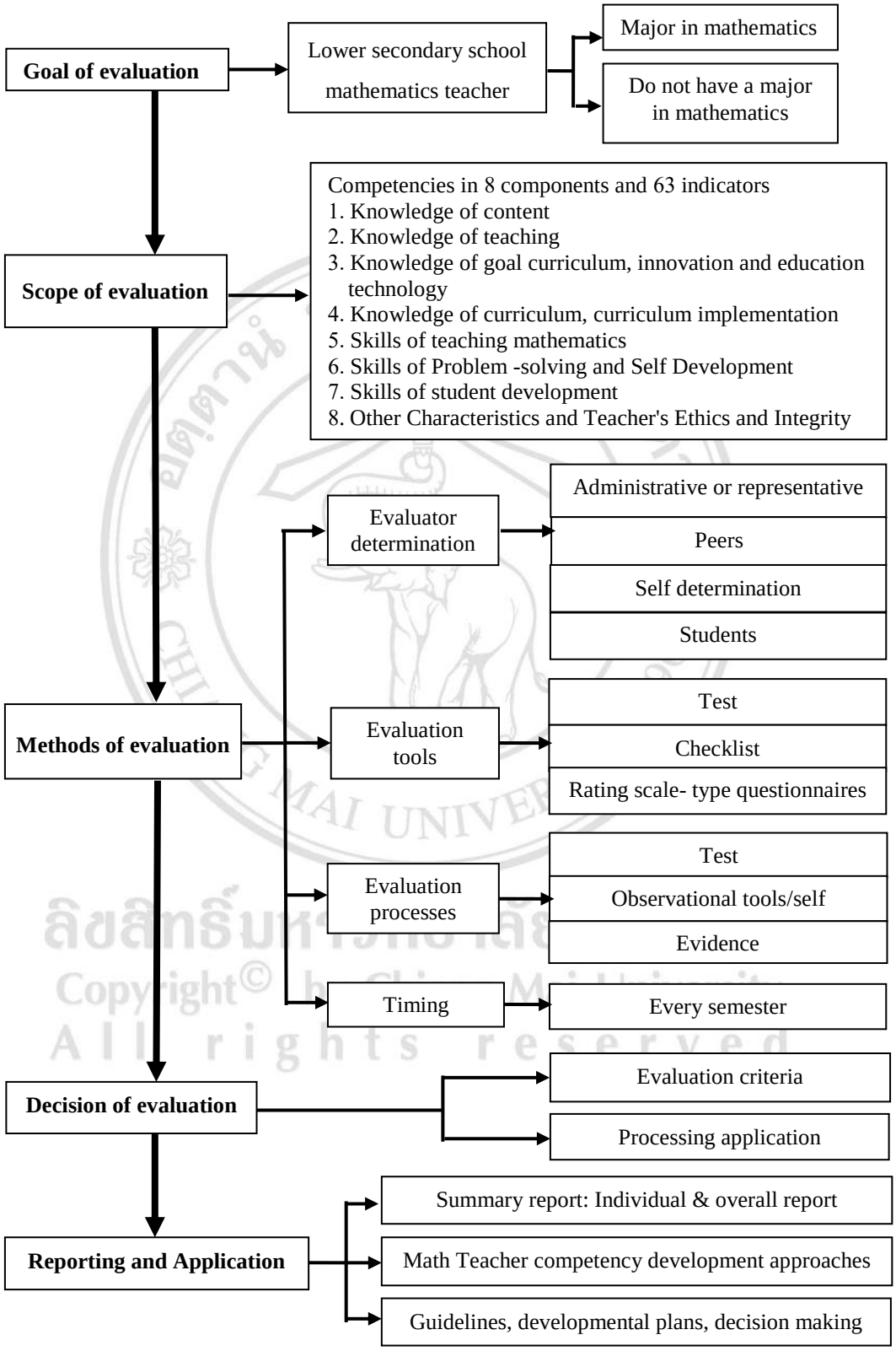
This manual for the evaluation of the lower secondary school mathematics teacher competency provides a detail of relevant information about mathematics teacher competency evaluation indicators. This manual aims to explicitly explain how to use an evaluation tools resulting in reliable consequences. It is a guideline to evaluating mathematic teachers in academic area, for instance, the lower secondary school. In addition, this manual also includes an evaluation of weaknesses and strengths of the teacher who was evaluated in order to develop mathematics teacher competency enhancement strategies. The process of evaluation includes the following elements:

1. Framework of an evaluation model for the lower secondary school mathematics teacher competency.

The evaluation model for the lower secondary school mathematics teacher competency was developed from the concept by McClelland (1973) defines that competency is a human character including knowledge, skills, attitude and personal characters that makes a person can do better job than others. Moreover, competence principles and practices from many resources: Lindman, 1964; Berliner & Tikunotf, 1976; Raynold, 1998; Lindman, 1978), the Pennsylvania State University's math teacher competencies, 1976; Standards of math teacher by The institute for the Promotion of Teaching Science and Technology(IPST), 2002; education standards of education for external quality assessment of teachers, 2010; standard of teacher as expert, 2004; teacher competency by Office of the Basic Education Commission of Thailand, 2008; teacher professional standards, 2008; teacher competency in 21st century and expert commentary were synthesized. The General System Theory (GST) by Von Bertalanffy (1968) has been applied as a fundamental framework to the lower secondary school mathematics teacher

competency assessment tools. The five components of mathematics teacher competency includes 1) goal of evaluation 2) scope of evaluation 3) methods of evaluation including qualifications of an evaluator, evaluation tools, and evaluation methods 4) decision of evaluation including criteria and processing program and 5) reporting and application.

The Evaluation Model of the Lower Secondary School Mathematics Teacher Competency



2. The goal of evaluation

This manual is the guideline for assessing the lower secondary school mathematics teacher competencies in terms of

2.1 Math teacher who is being assessed

1) Math teachers who has a major in mathematics
2) Math teacher who do not has a major in mathematics

2.2 Objectives of evaluation

1) to use as a guideline for the lower secondary school mathematic teacher's competency enhancement.

2) to use as an assessment tool in professional evaluation for the school administrators.

This model is suitable for a mathematics teacher who has been practicing in an academic area, for instance, a lower secondary school which has an explicit evaluation and professional development process.

3. Scope of Evaluation

The scope of evaluation includes the three core competencies which are: (1) content knowledge in mathematics, (2) mathematical teaching and learning skills, and (3) ethics and integrity for mathematic teaching establishment. Sixty-three competency's indicators were developed to explain the relationship between each indicator within 8 components as follows:

1) Knowledge of content 6 indicators.
2) Knowledge of teaching 6 indicators.
3) Knowledge of goal curriculum, innovation and education technology 4 indictors.
4) Knowledge of curriculum, curriculum implementation 10 indicators.
5) Teaching skills 14 indicators.
6) Problem -solving and Self Developmental skills 5 indicators.
7) Student development skills 6 indicators.
8) Other Characteristics and Teacher's Ethics and Integrity 12 indicators.

4. Method of Evaluation

The method of the lower secondary school mathematics teacher competency evaluation consists of:

4.1 Evaluator determination

Teacher evaluation is based on accuracy of information therefore the information must be from sources known to be reliable for the fairness of evaluation. Appropriate evaluators in this evaluation model are as follows:

1) School administrators or representatives.
2) Peer teachers
3) Students
4) Self

4.2 Evaluation tools

Evaluation tools consists of

1. The component of mathematical content knowledge's materials composed of

Test #1 the teacher assessment of knowledge in lower secondary school mathematics. Test items consist of 60 multiple choice questions with a time limit of 90 minutes.

Test #2 the teacher assessment of knowledge in lower secondary school mathematics teaching methods. Test items consist of 60 multiple choice questions with a time limit of 40 minutes.

Test #3 the teacher assessment of knowledge in lower secondary school mathematical curriculum and its applications. Test items consist of 80 multiple choice questions with a time limit of 50 minutes.

2. The component of teaching management skills' materials composed of

Checklist #1 a 14-checklist items for assessing the lower secondary school mathematic teacher's learning management skills.

Checklist #2 a 5-checklist items for assessing the lower secondary school mathematic teacher's problem-solving skills.

Checklist #3 a 6-checklist items for assessing the lower secondary school mathematic teacher's student learning development skills.

3. The component of ethics and integrity for mathematic teaching establishment's materials composed of a typical 5 level- rating scales, 12 items.

4.3 Evaluation processes are as the following steps:

1) The use of the evaluation model of the lower secondary school mathematics teacher competency was explained to stakeholders.

2) The school administrators provided opportunity to adopt the evaluation model in the school. The lower secondary school mathematic teachers practiced as indicated in the evaluation model. The mathematic teachers were evaluated by school administrators, peer teachers and students using checklists and a rating scale questionnaires while the mathematics teachers provided self-evaluation using the same evaluation tools.

3) Evaluators should observe and record behavior that indicates competencies continuously in order to have the reliable information supporting the competencies level evaluation for individual teachers.

4) Evaluators evaluate person's obvious behavior compared to the competencies measures required; each competencies is considered individually.

5) In the case that the indicator has been characterized of knowledge, understanding, thoughts, feelings that behavior is ambiguous, the evaluator can use interviews, or enquire the evaluated person as well. In case that the indicator fail to be evaluated because of no presence of the situation in duration of operation, the evaluator may use interview, or enquire by assuming the situation or skips assessment for such respective competency.

6) Once all competencies are evaluated, the evaluator or responsible person entries data into the computer for further processing

7) Data will be analyzed and reported in overall results. Each competency is considered individually.

8) Mathematics teacher competency development approaches are considered based on results and appropriateness.

9) Useful feedback is provided to the mathematics teacher at the end of the evaluation.

4.4 Timing

The evaluation should be administered every semester following the appropriate time as recommended in the evaluation model.

1) At the beginning of the semester (the first few weeks), the evaluation of mathematical content knowledge should be administered.

2) At the mid-semester and prior to the end of the semester (6^{th} – 8^{th} week and 12^{th} – 15^{th} week), the evaluation of teaching management skills should be administered based on appropriateness. However, some competencies can be evaluated as scheduled by the school, for example, a classroom research which may need some times to arrange evidence.

3) At the mid-semester and the end of semester (11^{th}-14^{th} week and 16^{th}-18^{th} week), the evaluation of ethics and integrity for mathematic teaching establishment should be administered. However, the time of evaluation in this issue is adjustable depends on the school timetable.

5. Decision of evaluation

5.1 Processing applications

In this study, Excel-based processing program was developed to facilitate those concerning data analysis. The weight of the indicators and compositions from an average of expert commentary was used to calculate the total scores in competencies evaluation to ensure of the most accuracy. All the weight of the factors and indicators were derived through the use of the Exploratory Factor Analysis.

Competencies	Total score	Percent of weight of score
1. Mathematical knowledge of content and teaching, and knowledge of curriculum implementation.		
1.1 Knowledge of content.	60	15
1.2 Knowledge of teaching.	60	15
1.3 Knowledge of goal curriculum, innovation and education technology.	20	5
1.4 Knowledge of curriculum, curriculum implementation.	60	15
Sum	**200**	**50**
2 Learning management skills		
2.1 Mathematical teaching skills	175	17
2.2 Problem -solving and Self Developmental skills	48	5
2.3 Student development skills	78	8
Sum	**301**	**30**
3 Other Characteristics and Teacher's Ethics and Integrity	**265**	**20**
Total	**766**	**100**

Processing Process

1. Scoring is given according to each components and indicators.

2. Scores obtained are recorded in “the processing program for competencies”

2.1 Processing competencies in mathematic content knowledge using test #1, test #2 and test #3, the responsible person entries the scores evaluate “content knowledge” window.

2.2 Processing competencies by school administrator or representative, the responsible person entries the scores evaluated by administrator into processing applications in the "assessed by evaluator" window.

2.3 Processing competencies by peer teacher, the responsible person entries the scores evaluated by peer into processing applications in the "assessed by evaluator" window.

2.4 Processing competencies evaluation regarding to self-report, the responsible person entries the scores in the “self-evaluation” window.

2.5 Processing competencies by student, the responsible person entries number of student and the scores evaluated by student into processing applications in the "assessed by student" window.

2.6 Processing each competencies score are shown in “competencies” when completing each part of competencies.

2.7 Processing overall scores are shown in “total scores” column when completing all 63 items.

3. Upon completing the evaluation results for all items, processing will be executed automatically.

5.2 Evaluation Criteria

Following evaluation process, the scores obtained were compared with the criteria for interpretation as follows,

1) Mathematical knowledge of content and teaching, and knowledge of curriculum implementation.

Percent of score	Quality criteria
Less than 60	Poor, urgent improvement is needed
between 60-79	Fair
80 and above	Good

2) Learning management skills

2.1 Criteria for a rating scale type questionnaire

Total score for indicator	**Score interval**		
	Quality level 1	**Quality level 2**	**Quality Level 3**
8	1-3	4-6	7-8
9	1-4	5-7	7-9
10	1-4	5-7	8-10
12	1-5	6-8	9-12
14	1-6	7-10	11-14
15	1-6	7-11	12-15

2.2 Criteria to interpret each indicator using an average score to compare with the quality level in this given table.

Average score	**Quality level**
1.00 – 1.49	Needs improvement
1.50 – 2.49	Fair
2.50 – 3.00	Good

3) Other Characteristics and Teacher's Ethics and Integrity.

Criteria to interpret each indicator using an average score to compare with the quality level in this given table.

Average score	**Quality level**
1.00 – 2.49	Needs improvement
2.50 – 3.99	Fair
4.00 – 5.00	Good

6. Reporting and Application

1. Type evaluation results and additional note according to Report Form of the lower secondary school competencies evaluation, evaluation results are shown in two parts.

1.1 Evaluation results in overall and in each respect of areas.

1.2 Evaluation results in each respect of item.

2. Evaluation results are recorded by the evaluator, and presented to the evaluated persons individually. Evaluation-supporting information is presented and the evaluator is exposed the opportunity to clarify and present additional information in case that the results are different. In addition, the disclosure of evaluation results is avoided to the irrelevant persons.

3. Giving feedback relevant to the findings in terms of strength and opportunities to enhance the lower school mathematics teacher's competencies and information for decision making in developmental guideline are consisted of

3.1 Individual results

3.2 Overall results

3.3 Positive results

3.4 Negative results which improvement is needed

3.5 The guideline for strengthen and develop competencies.

APPENDIX B

List of experts

Experts in content validity for indicators of Lower Secondary School mathematics teacher competency are as follows:

1. Dr. Junya PhuUdom	Matematics Department, Donmuang Chaturachinda School, Bangkok.
2. Soonthon SombatTheera	Matematics Department,Kanlayanawat School, Khon Kaen.
3. Asst.Prof. Chanon Chantra	Faculty of Education, Kasetsart University.
4. Nut Janyam	Matematics Department, Chaichimpleewittayakom School, Bangkok.
5. Wongdeon Pothipan	Retired Government Official, Educational supervisor, Chiang Mai Primary Educational Service Area Office 2.
6. Dr. Supot Seebut	Faculty of Science Ubon Ratchathani University.
7. Dr.Boonthong Boontawee	Bureau of Academic Affairs and Education and Educational Standards, Office of the Basic Education Commission of Thailand.
8. Assoc.Prof. Nopporn Yamsang	Faculty of Education,Ramkhamhaeng University.
9. Surat Intasang	Faculty of Education, Ramkhamhaeng University.

10. Assoc.Prof.Preecha Nowyenphol	School of Educational Studies, Sukhothai Thammathirat Open University.
11. Assoc. Prof. Siriporn Thipkong	Faculty of Education, Kasetsart University.
12. Dr. Sophon Yamtongcome	The Institute for the Promotion of Teaching Science and Technology (IPST)
13. Ronnachai Srisuthunyavong	Educational supervisor, Roi Et Primary Educational Service Area Office 1.
14. Dr. Nutjira Busadee	Faculty of Education, Chiang Mai University.
15. Prof. Yupin Pipitkul	Retired Government Official, Faculty of Education, Chulalongkorn University.
16. Wallapa Boonwiset	Mathematic Department, Benchama Maharat School. Ubon Ratchathani.
17. Thanomkiat Ngansakul	Mathematic Department, Muang Thalang School. Phuket.

Focus group experts are as follows:

1. Dr. Saroj KaewAroon	Director, Bunyawat Wittayalai School, Lampang.
2. Premsri Nampromsaen	Director, Chiangdao Wittayakom, Chiang Mai.
3. Wongdeon Pothipan	Retired Government Official, Educational supervisor, Chiang Mai Primary Educational Service Area Office 2.
4. Dr. Songkran Promwong	Educational supervisor, Chiang Mai Primary Educational Service Area Office 2.
5. Dr. Sriprapai Inchaithep	Boromarajonani College of Nursing, Lampang.

6. Asst.Prof.Dr.Phichsinee Chompukham	Faculty of Science and Technology, Chiang Mai Rajabhat University.
7. Worawit Sudket	Mathematics Department, Sanpatong Wittayakom School. Chiang Mai.
8. Sopa Chomcheun	Mathematics Department, Wattanothaipayap School. Chiang Mai.
9. Paisarn Jindaluang	Mathematics Department, Yupparaj Wittayalai School. Chiang Mai.
10. Prawit Kantathong	Mathematics Department, Navamindarajudis Payap School. Chiang Mai.
11. Cherdchai Lamnual	Mathematics Department, Navamindarajudis Payap School. Chiang Mai.

Experts in quality measurement of tools are as follows:

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2. Dr. Songkran Promwong	Educational supervisor, Chiang Mai Primary Educational Service Area Office 2.
3. Sopa Chomcheun	Mathematics Department, Wattanothaipayap School. Chiang Mai.
4. Paisarn Jindaluang	Mathematics Department, Yupparaj Wittayalai School. Chiang Mai.
5. Dr. Saroj KaewAroon	Director, Bunyawat Wittayalai School, Lampang.

6. Asst.Prof.Dr.Nalinee Na Nakhon	School of Educational Studies, Sukhothai Thammathirat Open University. Nonthaburi.
7. Soonthon SombatTheera	Matematics Department,Kanlayanawat School, Khon Kaen.
8. Samarn Siri	Educational supervisor, Chiang Mai Primary Educational Service Area Office 3.
9. Asst.Prof.Dr.Songchai Ugsonkid	Faculty of Education, Kasetsart University.
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11. Sujin Chowchaikul	Matematics Department, Triamudomsuksapattanakarn Khelangnakorn School, Lampang.

Experts who considered the appropriateness and consistency of the indicators as follows:

1. Asst.Prof.Dr .Narongwat Mingmit	Ban Somdet Chao Phraya Rajabhat University.
2. Aussawin Sribua	Bang Pa-in Rachanukhro1 School, Phra Nakhon Si Ayutthaya.
3. Karnmanee Thongkorn	Bunyawat Wittayalai School, Lampang.
4. Phannee Aunsripeng	Bunyawat Wittayalai School, Lampang.
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9. Nongklan Chukitkhun	Chak Kham Khanathon School, Lamphun.
10. Patcharin Muang-in	Chak Kham Khanathon School, Lamphun.

11. Yupin Panan	Chalermkwansatree School, Phitsanulok.
12. Renu Sriwattanasombat	Chalermkwansatri School, Phitsanulok.
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21. Wongdeon Pothipan	Educational supervisor, Chiang Mai Primary Educational Service Area Office 2.
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25. Thipakorn Chaiwiset	Kokhawittayakom School, Lampang.
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31. Sairung Sang-ngarrm	Maelao Wittayakom, Chiang Rai.
32. Jirawan Ruamchaiyaphoom	Maesaiprasitsart School, Chiang Rai.
33. Thongsao Promtan	Maesaiprasitsart School, Chiang Rai.
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39. Thitikarn Kadlangkar	Nareerat School, Phrae.
40. Thiwaporn Panyayong	Nareerat School, Phrae.
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43. Prawit Kantathong	Navamindarajudis Payap School. Chiang Mai.
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53. Supachai Jinaruk	Pua School, Nan
54. Nawalak Sasiwatpaisith	Pua School, Nan
55. Chukiat Netrthip	Pua School, Nan.
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57. Wanida Liamsri	Rongkwanganusorn School, Phrae.
58. Aussanee Sithiwong	Sa School, Nan.
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