Chapter 2

The Documents and Research that are related

The researcher studied the documents and the research that are related as follows:

2.1 The principle related to educational supervision

2.1.1 The definition of educational supervision

2.1.2 The objectives of educational supervision

2.1.3 The necessity of educational supervision

2.1.4 The principles of supervision

2.1.5 The educational Supervision model

2.1.6 The roles and responsibilities of supervisors

2.1.7 Knowledge Standards, professional standards, knowledge, potential and performance standards of professional supervisors

2.1.8 Theories related with educational supervision

2.1.9 The creation of the supervision model

2.1.10 Research related to supervision model

2.2 Empowerment

2.2.1 The definition of empowerment

2.2.2 Theories related to empowerment

2.2.3 Results for teacher empowerment

2.2.4 Research related to teacher empowerment

2.3 Documents about mathematic content group according to the Basic Education Core Curriculum B.E. 2551 (A.D.2008)

2.3.1 Vision

2.3.2 Learners' quality

2.3.3 Strand

2.1 The principle concepts related to educational supervision

2.1.1 The definition of educational supervision

Educators and educational agencies use the meaning of supervision which the researchers have studied and presented as follows:

Office of the National Primary Education Commission (2002, page 5) states that educational supervision is a key element in improving the quality of education and technical development. It also states the methods to use to make the media of supervisory tools consistent in order to change and improve the quality of learning management as policy and program goals. These are important commitments that all levels of supervisors must use to improve the quality of education.

Priyaporn Wong anutraroj (2003, page 21) has used the concept of Glickman regarding supervision as ideas that involve improving curriculum, learning management, media, facility, preparation and development of teachers as well as the assessment of learning management.

Wiles and Bondi (2004 p. 14) provide a meaning of communication that the cooperation, and interaction cues are more democratic than authoritative, and focus on the teacher center than the supervision.

Watchara Lawriendee (2011, page 5) has finalized the definition of educational supervision and learning management supervision of international studies, that supervision is an activity that supports teachers to improve and develop learning

management strategies that creates prosperity for the students. This is the main objective, by focusing on democracy, cooperation, morale and human relations.

Based on the definition above, we can conclude that educational supervision supports the process of democratic collaboration with regard to the relationship between people. The morale of workers to seek ways to improve the process of learning management by improving the quality of learning of teachers, so that students get to know the objectives of the curriculum.

2.1.2 The objectives of educational supervision

Supervision operating needs an aim in order to achieve the desired effect. The subcommittee learning reform, Ministry of Education (2000, page 13), has defined the objectives of supervision as follows:

1. The school has the potential to improve the learning quality of students to conform to curriculum standards.

2. The school is able to manage and learn management.

3. Develop curriculum and learning to be effective and consistent with community and social needs and keep pace with changes in all aspects.

4. People in the school are able to develop and increase knowledge, experience skills in organizing activities of learning and practicing, as well as the advancement of the profession.

5. Support and encourage the school to reform administration by allowing everyone to contribute ideas, share joint decisions and responsibility including participants being appreciated for their contribution.

6. To achieve coordination and cooperation in improving the quality of education between all accessories such as community, social and cultural and various professions.

The office of National Primary Education Commission (2002, page 9) defines the objectives of the educational supervision as follows:

1. To promote and develop education and educational standards of the school, the responsibilities of the Office of the National Primary Education Commission.

2. To solve the problem for assisting and giving advice to the executive, teachers and staff of the schools under the Office of National Primary Education. The operation to the learning management have to follow the curriculum, to achieve the aim as set out

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in the curriculum and policies of the Office of the National Primary Education Commission.

3. To develop innovative technology-based learning programs to be effective, including developing curriculum and materials of learning that are consistent with local needs.

4. To develop personnel in the schools under the Office of the National Primary Education Commission that have the knowledge and experience that is necessary to manage learning and can solve the problems of implementing it, including a morale in the implementation of the objectives of the policy roles of the Office of the National Primary Education Commission.

5. To consult and academics coordinate for the Office of the National Primary Education Commission, Office of Primary Education, district/sub-district Primary Education Office, and the schools under the Office of the National Primary Education Commission or the relevant authorities as well as other international organizations.

6. To coordinate cooperation with the Office of Education, Provincial Education Office, and the District Education Office, and be able to preserve the projects and development of all works that are assigned from the ministries and departments.

Watchara Lawriendee (2011, page 8) refers to the intention of supervision that aims to promote communication, can encourage teachers and stakeholders from the education management, for use with individuals or in groups. They have to collaborate to reform the methods of learning management, and to learn the method to manage education towards the success of the school to a higher standard in a higher level, and can keep a constant willingness to improve.

In the case of internal supervision, for supervision to be successful it requires a context conductive to supervision as follows:

1. The atmosphere and environment that is conducive to learning and performance.

2. Availability of materials for teaching and learning materials.

3. The good morale of staff.

4. Being a part of a team, harmony, or the unity of personnel.

In conclusion, the objectives of supervision is the process that leads to improved performance of teachers' learning management in order to help students to meet the objectives of education with regard to the development of a group or team who

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attended. Especially when teachers are competent, confident, and a good morale of work, causing the synchronization of relationship without conflict.

2.1.3 The necessity of educational supervision

The office of National Primary Education Commission (1998, page 8) said about the necessity of educational supervision, that educational supervision is a process that will cause great changes in current education and prevent damage in the future, The guidelines are as follows:

1. Protect means, if you find something that will cause problems for teaching, you have to protect against them first.

2. Solve means, you have supervision to fix the defect that occurs suddenly from a little thing to a big thing.

3. Building means to support and encourage people to research, and to use the methods and innovation in learning management.

4. Promote means, to support and encourage people to research what is appropriate to learning management for the curriculum as well as promote the learning management initiative.

Chanchai Ajinsamajarn (2004, page 1 1) mentions about the necessity of educational supervision as follows:

1. Educational supervision, there is a necessity for academic services. It is complicated and cumbersome because you have to be involved with people. Educational supervision is offered to many teachers who have different capabilities. And education has expanded dramatically; these also need the help of everyone.

2. Educational supervision is essential to the growth of teachers. Although teachers will be trained well, teachers also need to improve their training at work and in real life situations.

3. Educational supervision is a necessity to help teachers to prepare learning management and curriculum because teachers have to work together in various activities and are faced with a situation that is quite burden some. Teachers can not sacrifice a lot of time to sufficiently prepare curriculum, but educational supervision can reduce the burden of teachers in such cases.

4. Educational supervision is necessary to keep teachers as up to date personal, Because society is always changing. To contribute to the development of education both

theoritical and practical. The recommendations from the analysis of discussions together, and the discovery through research, and to progress as such, the educational supervision can provide this service.

5. Educational supervision is a necessity for a professional leadership kind of democracy. Educational supervision is able to provide benefits in a constructive way, besides that, it can also combine strength of all who participate in the study.

Surasak Pahay (2002, pages 2 6 -2 7) refers to the need for educational supervision as follows:

1. The process of social change, when the society changes, education must change to comply with it.

2. The division of assignments and duties of any government concerning the composition of the study must have two sides, such as the Department of Administration and the Technical Office. Supervisors will be technical officers responsible for supervising people who have to officiate for better results.

3. Expertise, to resolve all obstacles to make teaching better, there must be a worker who is selected from those who have knowledge, capacity, good behavior, and have experience to conduct supervision.

4. Education standards, normally schools are divided into Management and Administration. Administration and Technical office. The Technical office will be the head of departments or assistants who work with supervision in schools. But there are limits on the teacher's actions, narrow perspective or expertise. and could not keep the standard of education in the country because they only have internal supervision in their school.

In conclusion, educational supervision is important and a necessary condition of social change, especially in the field of education. Teachers should take good care of, and support the services received from the person who acts as the supervisor of joint educational standards.

2.1.4 Principles of supervision

Educational supervision is the study of epistemology that relies on science and art. The scientific principle of supervision is made from the cause and effect. The part that it is considered an art is used in the correct way both in terms of time and opportunity.

Sa-ngad Udtranan (1987, pages 15-19) presented the principles in educational supervision as follows:

Principle 1. Educational supervision is a process of collaboration between the executive, supervisors and those under supervision. The process will cover the meaning of working as a step, have a continuous non-stop and relevant interaction among practitioners.

Principle 2. Educational supervision is aimed at the quality of students, but the operation will work through intermediaries teachers and educational personnel.

Principle 3. Educational supervision (in Thailand) should emphasize the atmosphere of democracy.

Charee Maneesri (1999, pages 27-28) commented that in addition, supervision should be based on the principle that correctly from a technical basis, will have the clear goal, and be democratic. But will rely on all the principles to provide educational supervision effectively as follows:

1. The principle of leadership is to use the influence of people to make the activities of the group meet its objectives.

2. The principle of co-operation is a joint action and involves synergy of all to solve the problems together. By acknowledging and praising the result of collaboration to improve the teaching of various parties, and to fulfill the responsibilities in the organization, through assessment, and including the coordinator clearly.

3. The principles of considerateness in educational supervision must take into account the people who work considerately, and will realize the value of human relationships.

4. The principle of creativity, educational supervision has to push the teacher by the power of motivation to take the new initiative or to work on their own.

5. The principle of integration is a process which can gather disrupted completely and can be visible.

6. The principle of community is to find an important factor in the community and improve on those factors to promote well-being in the community.

7. The principle of planning means the process of analysis which is about the result predicted for of future. The formulation of objectives that are needed in advance,

and the development of alternative practices to achieve the purpose and choosing the most practical alternative appropriately.

8. The principle of flexibility means the ability to change, and always be ready to meet the changing conditions.

9. The principle of objectivity means the quality that is the result of the evidence based on fact rather than personal opinion.

10. The principle of evaluation means the truth by measuring the exact data from many sources.

From the concept above, It can be concluded that educational supervision should be based on the principle of democracy. It is common practice among supervisors and contractors to oversee and develop human resources and technical skills by focusing on the quality of the learners, make a plan, and working together as a system by focusing on group and individual.

2.1.5 Educational supervision model

Educational supervision is mobilized for the supervision recipient cooperation for changing teaching behavior. It is necessary to use many supervision model as follows:

Nipon Thaiphanich (1992, page 25) presented the clinical supervision model is the process for the observers of learning management in classes, that have taken steps in an orderly manner and to improve the knowledge of teachers. The teachers and supervisors will work closely together on lesson plans, observations of learning management, and assessment of learning management to find ways to improve. Clinical supervision is a participatory model of supervision that consists of 5 steps. This is a continuation of the sequence of supervision. It's called Cycle of Supervision as follows:

Step 1 Consultative conference before observing the learning. (Pre-observation Conference)

Step 2 Learning management observation. (Observation)

Step 3 Analysis of the data and determine the methods of strategy of supervision conference.(Analysis and Strategy)

Step 4 Supervision conferences.

Step 5 Post-conference analysis.

The process of clinical supervision starts with a pre-observation conference based on an understanding and agreement between the teachers and supervisors about the learning management system. Observing of learning management which the supervisors will conduct, and observation of learning management from the teachers in the classes, and an analysis of the data and assignment of the methods in the meeting. This is gathering the information of the behaviors of learning management as a category to be analyzed and in this process the teachers and supervisors are sharing the ideas and planning stages of the supervision conference. The supervision conferences have to give feedback about the behavior of learning management of the teachers. The final step is the post-conference analysis of the behavior of the supervision. This gives the opportunity for the teachers and supervisors to reflect on the working from the beginning of step 1 to step 4. To show good behavior of the supervision and revise defective behavior. The teachers have to be involved responsibility to give feedback about the behavior of the supervision.

Sergiovanni and Starratt (1988 p. 8-10) presented the model of Human Relations Supervision. Supervision is required to create a sense of satisfaction that happens to the teacher and shows interest in teachers as a importance person and have equal rights. Human Relations Supervision believed that satisfied personnel will make them work harder and easier to work together. Human Relations Supervision defining principles as follows:

1. It is believed that if the person in the organization is happy and has satisfaction, they will work harder and are easier to work with.

2. Emphasizes a democratic administration.

3. Emphasizes the importance of the personnel rather than the result of the work.

4. Teachers are important and have the freedom of rights, ideas and practice.

5. Holds the theory of human needs from Maslow and Theory Y from McGregor.

6. Anti ideas and theories of scientific.

7. Focus on creating joy and satisfaction in the performance of teachers.

8. Emphasizes the needs of society and personal feeling enhanced.

9. Emphasizes creating a feeling that they are important and valuable to the organization by the morale and satisfaction that happens in the teacher.

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10. Supervisors work with teachers with the emphasis on having a good relationship with each other in practice.

Walairat Boonyasawat (1995, pages 3 0 -3 1) presented about Humanistic Supervision that emphasizes the importance and the actions of others. This creates the environment that all can motivate and thrive and the success of all persons by working together. Besides that, She also offered the role and function of the humanistic supervisor as follows:

1. The duties to assessing - diagnosing function means to help teachers be able to assess-diagnose function the needs on their own.

2. The duties for planning function means to help or give advice to teachers so they can plan targets, objectives, and experiences in order to obtain maximum results.

3. The duties of motivating function means helping teachers to create an atmosphere and maintain a good atmosphere in the workplace.

4. The duties about strategic function means selecting and using several strategies to achieve the desired results.

5. The duties on research function are to help teachers to express their experiences and apply them in practice.

6. The duties on appraising in progress reporting function means helping teachers to evaluate and report the results to attain the goal or not.

Walairat Boonyasawat (1995, page 3 2) proposed guidelines for the humanistic supervision were as follows:

1. To create the revelation friendly cordial relations with the recipient's supervision, to trust each other, and be friendly to each other.

2. Supervisors and teachers work together towards the necessary requirements and all of the desires of the co-worker, including intellectual talent, individual goals, target institutions and joint planning.

3. Planning performance.

4. Observation of the operational plan, the supervisors will have to take on the role of the worker, learner, and supervisors at the same time. They need to consider and try to understand them clearly if they are understand how a student will interact with the teacher. The individual's role will help them to understand the performance and the behavior of the other party more fully.

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5. Performance analysis by the consultation conference is to exchange information.

Garubo and Rothstein (1998 p. 1-8) presented the ideas about support supervision. This is a situation of learning between the teacher and the supervision recipient, with supervisors learning a new way of thinking and new actions. The supervisors have to learn to trust the teacher and trust what the teachers see and hear. Meanwhile, teachers have to trust the supervisors will use the data that they have collected to help teachers improve and develop their teaching skills. Results of supportive supervision that can be seen clearly are friendliness to each other, the budding relationship between supervisors and teachers, and understanding all of the behavior in the class better. Supervisors and supervision recipients work together with the realization all the time with aims to provide for teachers and supervisors to get material information that has profound meaning, and to cover more about what's happened with learning management and supervision. This will allow teachers to have more options for learning management. Whenever a partnership of teachers and supervisors will have mutual success, teachers can learn to understand the problem and solve it. Meanwhile, the supervisors will take a good idea to clear up what happened in the classes. The result for the supervisors is they will have the opportunity to consider the operational supervision by themselves more, however, the emotion and the capacity to improve supervision plan to improve the learning situation properly is important, and to make support supervision effective, supervisors should consider these things as follows:

1. It is a learning situation between teachers and supervisors.(Learning situation)

2. There is a fundamental trust in each other.(Trust)

3. It is the method of co-operative supervision.(Co-operative Supervision)

4. To focus on developing the performance of teachers and supervisors at the same time.

5. The supervisory agent has to have specialized knowledge and communication skills.

6. Ultimate goal of supervision is a satisfaction of students and the development of learning outcomes.

7. Emphasis on the social and emotional process that happens in the classroom and accurate self-assessment. And understanding the feeling about the impact of the organization that effects the behavior of teachers and students in the school.

8. Motivation and encouragement of teachers to solve the problems by themselves, but the supervisors giving support without direct control.

9. Need to evaluate the process and the behavior of operation of teachers/supervisors continually.

The office of National Primary Education Commission (2002, pages 8-10) suggested the system of supervision as follows:

1. Direct supervision is the supervision that supervisors assist, suggest, and consult directly to the supervision recipient.

2. Indirect supervision is the supervision to supervisors through a media process with the receiver of supervision such as to read the documents, exhibitions, and field trips.

3. Supervision of individuals is the supervision that the supervision recipient will get assistance, advisory and give consultation individually.

4. Group supervision is the supervision that supervisors will give assistance, advisory, and consultation in 2 or more people. Activities that are often used are conferences, workshop, and field trips.

In addition to these specific steps of the supervision process for 5 steps were as follows:

1. A study of current conditions, problems, and developmental needs, is a study of the supervision recipient responsibilities by using various tools such as survey forms, questionnaire, and self-evaluation forms. Study from the results of operation such as achievement, the preparation of lesson plans, and the preparation of classroom administration, Productivities of teachers and students.

2. Planning and selection, such as considering the relationship of the development point with the supervision that is consistent with the overall or specific problems. The technique that should be used, resources and potential supervisors, selecting the options, planning the supervision together with the supervision recipients.

3. Creating media and tools to develop the method, seeking media or tools that are already planned and prepared as appropriate.

4. The operating supervision as planned.

5. Assessment and reporting with regards to changes, in the development of the supervision recipient, the work of the supervision recipient, the use of assessment tools for the purposes of supervision, and published works of supervision.

A study of the supervision system above can be summarized as 2 dimensional as follows:

1. Dimension of the fundamental belief of supervision as follows:

1.1 Supervision is a process that performs a procedure.

1.2 Supervision action to improve the effect of learning management of teachers.

1.3 The Synergy of supervisors and teachers who receive supervision are important in the supervision process.

1.4 Pleasure and satisfaction of people in the organization have an effect on the performance of individuals in the organization.

1.5 Supervision should be managed democratically.

1.6 Supervision emphasizes the importance of the person more than the work.

1.7 Teachers are important and should have the freedom to think and perform.

1.8 Creating the important personal feeling and building the morale of teachers is important for the supervision process.

1.9 Supervision has to emphasize a good working atmosphere and has to create prosperity for teachers.

1.10 Human relationships, trusting each other, and sincerity are necessary for supervision.

1.11 Supervision is learning together between supervisors and supervision recipient.

1.12 Supervisors and supervision recipient have to realize together the goal of supervision; to get the information that is most meaningful and use this information to develop the learning of students.

1.13 Supervision has to help teachers solve problems by themselves without any control.

1.14 Supervision has to be evaluated continuously.

1.15 Supervision can be implemented in different ways, both direct supervision, indirect supervision, individual supervision, and group supervision.

2. Dimension of the methods:

2.1 Creating a good relationship, friendly to each other, and expressed interest in the person.

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2.2 Study in the current condition, problem, and analyzing the needs of the learning management.

2.3 Conferences or workshop to create knowledge in understanding the context of the subject to teach, and to create agreement required for interoperability.

2.4 The joint target, alternative and tools for practitioners.

2.5 Define the plan together.

2.6 To establish priorities for teachers by providing freedom of thinking and performance.

2.7 Observe learning management.

2.8 To create a good atmosphere and satisfaction in work for teachers.

2.9 To create learning together between supervisors and supervision recipient.

2.10 Promoting teachers so they can solve the problems of learning management and achieve on their own.

2.11 Using the communication skills properly.

2.12 Monitoring and evaluation of supervision and to publish the works of teachers regularly.

2.13 Discussions between supervisors and supervision recipient.

Researchers took the discovery from the study of the supervision system both 2 dimensional to use the basic concept to determine the behavior of supervision, the methods of supervision, and the activities of supervision for mathematic teachers, School under office of Primary Education Service Area in Upper Northern Region.

6. The responsibility roles of the supervisors

Supervisors, or the person who is acting as a the supervisor, has a role and several obligations, with the main duties to help, guide or support the development of educational quality, and learning management quality. But educational quality and learning management quality must involve many different elements and many staff members. Then educators have to define the role of the supervisor or the person who is acting supervisor, such as:

Oliva and Pawlas (1997 p. 576) designated a supervisory role in four ways as follows:

1. The role of coordinator has to contact all of the programs in each level and help teachers to be aware of problems for each other.

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2. The role of consultant is as an advisor to the teachers individually and for groups who need advice.

3. The role of evaluator is the person who helps teachers evaluate the learning management, course evaluation, and self-assessment.

In addition, supervisors must work in other functions as follows:

1. The expert of learning management is a person who has knowledge about the techniques taught in at least one method.

2. To be a expert of a curriculum is a person who has knowledge about the course and can improve the method.

3. A good communicator and conveyor. This is a person who can link different information of the opinions of teachers and has good leadership skills.

4. To be manager meaning, a person who has thinking skills programs that are useful for teachers.

5. To be a person who is thought provoking; meaning a person who suggests or offers an opinion to the teacher to consider.

6. To be the manager who helps new teachers; meaning the person who is responsible for helping new teachers who are unfamiliar with the school and community.

7. To do public relations with the community; meaning a person who is the publisher of all the information of schools to the community.

8. To be researchers; meaning to be leaded who takes the research results to the teachers for them to use and conduct research, especially action research.

9. To be a leader of change; meaning to be a catalyst or conductor of change by helping teachers to change and develop.

10. To be the master teacher means, a person who can demonstrate effective teaching to teachers and has learning management capacity and make recommendations to teachers.

Glickman and others (2001 p. 11-12) mention the work of supervision that will lead to effective learning of students, and the schools to have effectiveness in 5 jobs as follows:

1. Direct Assistance, the supervisors can give feedback to teachers to improve all of the learning management of supervision such as clinical supervision.

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2. Staff development, by providing opportunities for new learning in order to improve learning management.

3. Curriculum development, supervisors can help teachers to adapt the curriculum, materials and equipment to improve learning management.

4. Group development, supervisors should have educational conferences for teacher training and work together to solve the problems to improve learning management.

5. Action research, supervisors can help teachers evaluate their own learning management to improve their learning process development.

Wiles and Bondi (2004 p. 15-16), assigned the duties of supervision in 3 tasks such as:

1. Administration consist of setting goals and priorities target as follows:

1.1 Assign the standard and policy development.

1.2 Long-term planning.

1.3 Organizational structure.

1.4 To allocate resources used appropriately.

1.5 Personnel selection and assignments.

1.6 Prepares the facilities.

1.7 Funding and oversee the use of funds.

1.8 Dealing with learning management.

2. Curriculum-oriented supervision as follows:

2.1 Consider the purpose of learning management.

2.2 Exploration needs and do research.

2.3 Develop the program and planning for transition.

2.4 Link special services programs.

2.5 Selection of materials, equipment and divide resources.

2.6 Orientation for new teachers to get to know the school and the community.

2.7 Advise and support facilities.

2.8 Estimated expenses needed for learning management.

2.9 Prepare the program of learning management.

2.10 Develop and disseminate programs of the school.

3. Organization of Instruction as follows:

3.1 Development plan of learning management by working together with teachers.

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3.2 Evaluation all of the programs of the school.

3.3 Create new creative applications.

3.4 Designed new learning management tools to develop effectiveness of learning management.

3.5 To prepare a media of teaching for teachers.

3.6 Give advice and assist teachers by consulting about learning management.

3.7 Evaluation of facilities and monitoring the use of the facilities.

3.8 Funding and monitoring the use of funds to meet the objectives.

3.9 Prepare the training project, training for the teachers and coordinated projects.

3.10 Responds to the needs of what the community needs, and accepts the feedback from the community.

In summary, the important role of supervisors, or the person who acts as supervisor, is to work on curriculum development, learning management, staff development, creating materials for teaching, community relationships building, and action research to improve and develop learning management. The supervisor, or the person who acts as supervisor, functions to attain in every aspect related to the development of educational quality to help encourage and give advice to teachers, so they can practice teaching for the students to be further developed. As well as the capacity to link spatial dimensions of the education process together, for planning, managing, and evaluating the curriculum by recommending, monitoring, and teacher supporting.

7. Knowledge standards, professional standards, knowledge, competencies and performance standards of professional supervisors

Cabinet Secretariat (2006, pages 282-288; 2010, pages 62-63) announced to the board council about knowledge standards, professional standards, knowledge abstract, competencies and performance standards of professional supervisors, in the gazette as follows:

Article 1 Professional supervisors require knowledge standards such as:

A. Have minimum qualifications of Master's degree of science in education or equivalent or other qualifications that the teachers' council guarantees, and have knowledge as follows:

1. Educational supervision.

2. Policy and planning education.

3. The development of the curriculum and the learning process.

4. Educational quality assurance.

5. Educational administration .

6. Educational research.

7. Strategies to transfer knowledge, concepts, theories and academic
performance.

8. Information Technology management.

9. Ethics for professional education.

   B.   Through the training of the supervision courses that is certified by the
teachers' council.

   Article 2 Professional supervisors must have professional experience standards
as follows:

   1. Have teaching experiences for not less than five years or have
experience of operational learning management and experience in school administrator
or executive education combination for not less than five years.

   2. Having a quality of academic performance and dissemination.

   Article 3 Educational supervision included with a knowledge and competencies
as follows:

   A. Knowledge.

   1. Principles and supervision model.

   2. The methods and supervision process.

   3. Supervision strategy.

   3.1 Analysis behavior of supervision.

   3.2 Building the skills of the supervision.

   3.3 Using strategies of supervision.

   3.4 Taking innovations applied in supervision.

   3.5 Controlling and assessment educational quality development.

   4. The internal supervision.

B. Competencies.

       1. Able to analysis, research, promote, and provide feedback to the development of the internal supervision.

       2. Able to follow, evaluate, and report the learning process and educational management.

       3. Able to coordinate, support, and publish a portfolio of educational supervision to the relevant departments.

       4. Able to use a variety of communication techniques with good will.

Article 4 Policy and educational planning including knowledge and performance as follows:

A. Knowledge.

    1. Systems and planning theory.

    2. The context of economic, social, and Thai politics that have influence on education.

    3. National study plan and other levels.

    4. Analyze and specify the education policy.

    5. Educational planning.

    6. The development and educational policies assessment.

B. Competencies.

       1. Able to give advice and counseling about data analysis, and report to make a policy, plan, monitoring and educational assessment.

       2. Able to give advice and counseling about specific policy, planning operations and educational quality assessment .

       3. Able to give advice and counseling about making the plan of educational quality development focuses on good achievement, that is worthwhile for developing the educational quality, social, and environmental sustainability.

Article 5 Curriculum development and learning management, including knowledge and competencies as follows:

A. Knowledge.

    1. Knowledge of curriculum.

    2. Creating a curriculum for school.

    3. The principles of curriculum development.

4. Learning management.

5. Educational psychology.

6. Measurement and evaluation.

7. Special education.

   B. Competencies.

   1. Able to give advice and counseling about development curriculum and the preparation of the curriculum for schools.

   2. Able to demonstrate and introduce teachers to conduct activities that promote learning potential of students.

   3. Able to evaluate the curriculum and curriculum implementation.

Article 6 Educational quality assurance including knowledge and competencies as follows:

   A. Knowledge.

   1. Quality management.

   2. Educational quality assurance.

   3. Educational quality standards.

   4. Educational quality assessment process of internal and external programs of schools.

   B. Competencies.

   1. Able to study, analyze, research, prepare standards, and develop internal education quality assurance system in the schools.

   2. Able to supervise, direct, follow, and evaluate quality assurance of education in schools.

   3. Able to give counseling, suggestion, and establishing systems for reporting the school selves assessment, and to develop continually for external assessment.

Article 7 Education management, including knowledge and competencies as follows:

   A. Knowledge .

   1. The principle and scope of education management system.

   2. The principle of the school - based education management.

   3. Education reform.

   4. Laws and regulations related to education management.

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B. Competencies.

　　　　1. Able to counsel and give advice about education management to achieve their objectives for the purpose of education.

　　　　2. Able to supervise the schools to be a learning organization.

　　　　3. Able to manage the school - based education.

Article 8 Educational research including knowledge and competencies as follows:

A. Knowledge.

　　1. Research methodology.

　　2. Research process.

　　3. Apply the results of research.

B. Competencies.

　　1. Able to give advice and counseling about applying the research process to solve problems for learning management development.

　　2. Able to give advice and counseling about applying the research results for curriculum development.

　　3. Able to conduct research to create new knowledge, learning and education management.

Article 9 Strategies to transfer knowledge, concept, theory, and academic performance work including knowledge and competencies as follows:

A. Knowledge**.**

　　1. Strategies of knowledge presentation, concept, and theory suitable for learning.

　　2. Reports, articles, workings, research, etc.

　　3. Analysis, and criticism of academic performance creatively.

B. Competencies.

　　1. Able to write academic documents of various types.

　　2. Able to give advice and consult about writing academic papers to teachers and educational personnel.

　　3. Able to present knowledge, concept, and theory with a variety of methods for the appropriate way of learning.

Article 10 Management Information Technology including knowledge and competencies as follows:

    A. Knowledge**.**

       1. The principles of Information Technology.

       2. The Internet.

       3. Computer assisted instruction.

       4. Interactive multimedia systems.

       5. Automatic office.

    B. Competencies.

       1. Able to use Information Technology for developing one self and improve work productivity.

       2. Able to consult and guide the use of Information Technology to improve education management of schools.

Article 11 Moral and ethics for professional education including knowledge and competencies as follows:

    A. Knowledge.

       1. Moral and ethics for professional education.

       2. Professional education ethics.

       3. Good governance.

    B. Competencies**.**

       1. Practice by professional ethics education.

       2. Have the principle of supervision and behave as a role model.

Article 12 Professional supervisors must comply with performance standards as follows:

       1. Perform academic activities about the development of supervision to provide professional development in education.

       2. Decide to practice educational supervision activities with regard to the consequences to the supervision recipient.

       3. Committed to develop a supervision recipient to oversee the implementation of activities until it has an effect on the development to its full potential.

       4. Develop a supervision plan to implement the actual results.

5. Develop and use innovative implementation of educational supervision until an effect of the high-quality work can be seen in a sequence.

6. Develop some activities of educational supervision by focusing on the permanent supervision recipient.

7. Able to report on the supervisory education systematically.

8. Practice good behaviors to be a good example.

9. Join with others to develop work constructively.

10. Seek and use information for development.

11. To be a leader and academic leader.

12. Create opportunities for the development of work in every situation.

Knowledge and competencies above, The Office of Primary Educational Service Area Office, which is an agency under the Ministry of Education uses as a guide to define the roles, missions, plan, project, supervision activities of supervisors in the region, The researcher who performs the duty as a supervisor have to use as a guide to determine their roles in order to strengthen the learning management of mathematics teachers continually.

8. Educational supervision theories

Operation of education supervision to work effectively requires holding the importance of the principle theory as follows:

8.1 Theories of adult learning

Knowledge and understanding of adults (teachers) and teacher development is important and relevant for supervision and supervisors directly. Although in education, supervision or the supervision of teaching knowledge to adults and the development of adults and the ways to develop adults is not the most important issue for the supervisor, but the supervising of the supervisors should have knowledge about the supervision recipients. Glickman and Others (2004 p.52) concludes that the development of adults for learning is according to the order they have to change the understanding of learning of adults, and their needs in order to change the process. This included the natural knowledge and capacity and relationship of adults with their environment. Wiles and Bondi (2004 p.152-153) mention these principles of adult learning as follows:

8.1.1 The learning of adults has to rely on their experience as a basis for learning.

8.1.2 The promotion of adults learning has to take into account the needs of adults, mainly the direct benefit to job responsibility.

8.1.3 Explaining the contents should proceed slowly because adults have to take time to consider more.

8.1.4 Adults are always afraid face losing.

8.1.5 Adults will learn better if they have to participate and exchange ideas freely.

8.1.6 It should give more time for adults to learn more.

8.1.7 Should manage the learning resource to be enough and close by.

8.1.8 Adults who have developed their own faith. It is difficult to change them.

8.1.9 Adults have attitudes and weaknesses that are different.

8.1.10 Adults, as well as children, have disabilities in learning and learn differently.

8.1.11 Giving the learning of adults should follow the sequence of development but has it to be related with the needs of adults.

8.1.12 Adults are often interested in other things unrelated with learning.

8.1.13 Sometimes adults use the opportunities of education to socialize with other people.

8.1.14 Adults tend to be nervous and lack confidence.

8.1.15 Adults are responsible for their own learning but dislike to be forced to learn.

8.1.16 Adults prefer to study with a group and learn with practice in conjunction with other methods.

Therefore, supervisors should specify the guidelines to have activities of supervisory as follows:

1. Learning management for adults should be a learning mate.

2. The atmosphere in learning is not stressful but has to be relaxed, feel safe, friendly, and unlimited time.

3. Evaluation of learning such as pass or fail, or no evaluations, but they have to choose to study by their satisfaction and needs.

4. The performance of teaching has to be a slow, clear voice, the media that is used for learning has to clear, Published works should be big and easy to read because adults are easily bored, have a short attention, do not like to waste time with other things.

In summary, the concept about learning management to develop adults has to think about the demands, naturally age, and capacity for developing the learning that are different. Emphasis on participation in learning activities that is consistent with the requirements and linked to the original experience.

8.2 Motivational theory

Motivation is necessary for supervision because the supervisor that is successful needs to create motivation for self- improvement. The professional development with teachers continually, and seek cooperation in the workplace. The motivation may be an object, money, things, or the opportunity to have an important job. Desirable physical conditions within the good working environment is also needed for the atmosphere, with a good model of materials. Friendly atmosphere, respect for each other, the state of work that challenges to do or are consistent with talent, these things are necessary for the supervisors to pay attention to know the teachers that they are working with and knowing and understanding about their needs. The real interests of those teachers will bring motivation, cooperation, and process to the goals because supervision is helping and advising, to support teachers to make behavioral changes that affect the learning outcomes of students and the quality of education.

Supervision has to come from needs and accepting that the teachers is essential. It is necessary that the supervisors use appropriate methods of motivation teachers in each group including supervisory techniques in appropriate ways. (Watchara Lawriendee, 2011, page 63-64). The researchers studied about motivation - hygiene theory of Herzberg (Herzberg 1988, cited Glickman and others 2004 p. 83-84). They presented motivation theory which proposes up to two components is motivation factors and hygiene factors as follows:

8.2.1 The Motivation factors is the factors of satisfaction including:

1) Possibility of growth.

2) Advancement.

3) Recognition.

4) Responsibility.
5) Achievement.

8.2.2 Hygiene factors are the factors that prevent dissatisfaction including:

1) Salary.

2) Working conditions.

3) Job security.

4) Personal life.

5) Policy of schools management.

6) Supervision and technical of supervision.

7) The relationships between the individuals at work.

8) The position or status of a person.

Watchara Lawriendee (2011, pages 66-69) studied and analyzed the motivation theory and the research that is related with Herzberg and team. His original conclusion and the important ideas of Motivation - hygiene Theory to guide for supervision of learning management is as follows:

1. There are some conditions in work that teachers expect to enjoy while working. Conditions or state that have a response about sufficiently quantified, teachers will work only in moderation and have to adjust themselves to the situation, but if the conditions have not responded continuously, the teachers are unhappy and the results of operations will not be good.

2. Conditions at work that teachers expect as part of the relationship with each other in the workplace. There are hygienic factors, the non-appearance of hygienic factors will result in dissatisfaction and low performance of teachers. But if these factors appear at work and will be maintained with good relations in the workplace, but could not motivate teachers to motivate them to perform better. So the hygienic factors must be related with the cooperation of work.

3. The factors that help teachers to perform better are motivators. If a lack of motivation will cause dissatisfaction for teachers or have an effect on the relationship of the personnel in the workplace, then the factors of motivation will relate to the intention of the operation.

4. The factors of motivation and the hygienic factors are different. Motivation at work is not as a result of maximizing hygienic factors.

5. Hygienic factors are related to the condition of working conditions that the external factors such as money, earnings, proper supervision, and a sense that is the part

of the workplace. The factors of motivation are related to the job directly, and are the internal factors that the feeling is happening inside, such as the recognized commendable achievement, has been responsible for more jobs.

6. The hygienic factors are important because they will help prevent problems in the work environment because the problems may come from dissatisfaction and thus low operational quality.

7. The hygienic factors that respond to the needs of individuals will help avoid dissatisfaction and resistance in some ways. But the factors of motivation will respond to human needs of psychological growth.

8. Satisfaction at work does not motivate the performance of individuals, but it is the best result of the quality of performance of the individual. So both executives and supervisors should not be used to satisfy happenings that motivate teachers to perform. Satisfaction should be targeted so that teachers have to reach it, which is derived from their performance quality and their effectiveness.

9. The executives and supervisors who take satisfaction in working and can motivate teachers means that they can use human relationships in the performance. It has not been proven to be an effective way because using human relationships or building a good relationship is a hygienic factors.

10. The executives and supervisors who give priority to the satisfaction in the operation as a goal that teachers should seek and can reach by performance, efficiency, and achievement. It means using supervision to focus human resource supervision; it has been proven to be a very effective communication method that develops human resources as a component of motivation.

11. It is the fact that most teachers will be expected to respond to the theory of Herzberg (Motivation-hygiene Theory), although not all.

In conclusion, Motivation-hygiene Theory of Herzberg said that teachers will work with the needs of two different types such as the needs in category 1 respond with hygienic factors, if this factors is ignored, the satisfaction in the work were rare, performance declines or deteriorates, and the productivity level is very low and cannot be accepted. The needs in category 2 respond with motivation factors which are not part of the job but it can be built up at work. This factors will help promote and develop better performance. If the motivation factors are neglected, personnel may not be

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satisfied but the performance of these individuals will not go beyond more than these words, "Work for a fee". What should be remembered for supervision and supervisors is that some teachers may be interested with motivation-hygiene more than motivation factors. Therefore, supervisors will have to choose the methods to encourage teachers to pay attention to the motivation factors more, and use many techniques, and skills to motivate and encourage motivation.

8.3 Communication theory

Costa and Garmston (2002) refer from Watchara Lawriendee (2011, pages 81-82) has concluded the importance of communication, that communications are necessary and important to the educational supervision, because supervision is the performance to help teachers of the curriculum that need to communicate with each other. Communication occurs in every organization and is unavoidable, as long as the administration and performance in the organization or institute requires communication. Communication contains many features such as verbal, written language, body language, pictures, and codes. For supervision, communication between supervisors, or operator supervision, and the person who receives supervision, and the person who are related, it will require communication in many forms to convey the meaning to the person who receives supervision correctly. The important thing is that communication has to show and come up with the feeling. Communication as an executive position with the supervisors should be different with goals and objectives. So supervisors should understand communications for supervision as well as the meaning, aim, methods to communication, communication factors of effectiveness, and interpersonal skills of supervision to manage communication effectively for successful work on target using the communication factors as follows:

8.3.1 Communicator.

8.3.2 The methods of communication.

8.3.3 Information or news such as word, command, advice, report, rumor, opinion, and suggestion.

8.3.4 Receiver which can use the factors of communication together in the model of communication as follows:

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1. One-way communication is the only one-way of communication from the messengers without any feedback from the others. Which may provide the message or describe practices that do not require a response from the receiver.

2. Two-way communication is the communication that is used in practice. This will be communication that is interactive between receivers and messengers.

The communication of these 2 models as important communication were as follows:

1. Verbal communication has to use the words to convey the meaning clearly.

2. Written communication has to write with written language that is correct and easy to understand.

3. Body language uses facial expressions, eyes, actions, and attitudes.

4. Verbal, and using body language are both verbal communication, and writing can convey the meaning to help understand easier.

5. Verbal, equipment, and symbols to convey the meaning and be understood, but they are not the same, but if there are the words to show, the explanation will help listeners understand more.

In the theory that relates with supervision, research used as the base ideas to specify the methods of educational supervision such as thinking of learning, the quality of the learning development of adults, enhancing morale, and communicating in 2-way communication as well as using a variety of communication tools as appropriate.

9. The creation of the supervision model

9.1 The meaning of model

Suphakit Wongwiwatthananukit (2007, page 178) said that model means conceptual framework, structure, symbol or mathematical equations, and statistics that show the concept. The limited overview relating to the relationship between the variables in research using the structure to perform the research in stages that answer the questions of research correctly.

Yaowadee Rangchaikul Wiboonsri (2008, p.27) said that a model or replica of the method that anyone can transfer ideas, understanding, including imagination that is a phenomena, or any story that appears by using various communications such as a drawing, portrait, chart, a map or mathematical equations, That can be used to understand easily, and at the same time it can be presented as a story or issues with narrowing under the principle as a system.

Rattana Buason (2009, page 124) refer the meaning of model, classification into 3 meanings as follow:

      1. Diagram or sketch of something that did not completely like the real thing. This model in the transcribed in Thai is often called that "model" such as, house models, car models, and clothes models.

      2. The relationship of variable pattern or mathematical equations that known by name called "Mathematical Model".

      3. Diagram that shows the functional elements of any model, in this meaning, sometimes called the thumbnail view of theories or concepts in any subject, such as, teaching models, management models, the evaluation models.

      Tai Xiang Zhee (2010, page 1 0) said that a model means to simulate the real thing or possibly the theory. It is a link that shows the relationship between the data, symbol, the principle of the system, or a link from theory into concrete practice.

      From the concept of educator above, we can conclude that the model means conveying the ideas or information that shows the relationship of the factors that are related with any system, and to explain phenomenon or all of a the story of a system.

9.2 Characteristics of good model

      Keeves (1988, p.560) and Waro Pengsawat (2010, page 8), give summarize of the idea was to match the characteristics of good models.

      1. The model should contain with Structural Relationship more than Associative Relationship.

      2. Model should guide to prophecies the results will occur that can be checked with empirical data.

      3. Model should explain the Structural Relationship for the correlation study.

      4. The model should be a tool to create new concept and create a relationship of a new variant. This will increase the knowledge in the subject are studying.

9.3 The model categories, educators has been offered the categories of model, as follow:

      Smith and others (1980, p. 461), classification the model into 2 categories.

      1. Physical Model is classified as follows;

      1.1 Iconic Model is looks like the real thing, such as, aircraft models.

1.2 Analog Model is similar with the real phenomenon, such as, chemical experiments in the laboratory prior to experiment the aircraft models that can fly.

2. Symbolic Model is classified as follows;

2.1 Verbal Model or Qualitative Model, it is commonly message to use to describe a brief message.

2.2 Mathematical Model Or quantitative model such as, equations.

Keeves (1988, p. 561 - 565), has identified four categories of models.

1. Metaphorical model is a physical model, the most used the scientific, such as, model of atomic structure, and this model will be built by using the structure to compare the structural of model consistent with the characteristics that similar with physical, in accordance with the information and knowledge that exist in nature as well. Models that are created must have clear factors, and can be tested with empirical data, and can be apply with the conclusions of various phenomena widely.

2. Verbal Model is a model that used language to communicated to describe or explain the phenomenon that studied with languages, chart, picture, in order to structure ideas, factors, and the relationship of each element in the phenomenon itself by using descriptive text to clarify more.

3. Mathematical model is a model that shows the relationship of factors or variables by using mathematical symbols.

4. A causal model is a model that starts from the path analysis, in the study of genetics. This causal model is makes it possible to study the verbal model that have variable complexities. The main concept of this model such as, must be created from theory or research already, the model is written in a linear equation.

9.4 The factors of model.

Educators referred the concepts about the factors of model according to the phenomenon studied.

Brown and Moberg (1980, p. 16 - 17) has synthetic the model form system approach with contingency approach said that the factors of model include with:

1. Environment

2. Technology

3. Structure

4. Management process

Somboon Sirisanhiran (2004, pages 354-355) have developed a leadership of dean developing model; Found that the factors of model should have:

    1. Feature administrative of leadership must be developed.

    2. The principles and objectives of models.

    3. The process of development of administrative leadership.

    4. Guidelines to apply the model, Conditions and an indicator of successful.

Chanoknaat Chunchey (2007, pages 179-180) has developed a management model for continuing education in private education institutions found the factors of model were 9 factors as follow;

    1. The philosophy and principles of continuing education.

    2. The target group of continuing education.

    3. The aim of continuing education.

    4. The Management structure of continuing education.

    5. Continuing Education Courses

    6. How to manage continuing education.

    7. Media and Learning Resources

    8. Monitoring and Evaluation of Continuing Education.

    9. The relative level and transfer the grades.

Theera Runchareoun (2007, page 32) has proposed the factors of model that has 6 factors.

    1. Principle

    2. Objectives

    3. Systems and Mechanisms

    4. Implementation

    5. Evaluations

    6. Conditions

From the study and the concept of educators can conclude that the model had core factors as follows:

    1. Concept

    2. Objectives

    3. Conditions

    4. Process, Mechanism, Method, and Media

    5. Evaluations

9.5 The process of creating and developing a model of educational supervision.

Boonchom Srisa-at (1992, pages 104-106, cited in Thiwarak Sereephap, 2005 p.62) proposed the steps of model creating and developing that could do it in 2 steps as follows:

1. Creating or developing the model by the researchers created a model based on assumptions first from the study and research theory. The concept of a model that someone has developed on the same subject or any other subject and the result of education or the result of research that is relevant. Analysis of various scenarios, helps to specify the factors or variables in the model including all of the relationships between factors or variables, or chronological order of each factor in the model. To develop the model has to use the rational basis and a study which will be beneficial to the development of the model. Researchers may first think the structure of the model improves the model based on the information from the studied theory, concept, model or the result of research related. The study of the sub-factors or each variable can then choose the sub-factors or the important variables that build the structure of the model. The key to this steps is to choose the factors in the model to get the right model, and should have specific principles to develop a model clearly.

2. Testing the model validity, after the development of model in the beginning, because the model is developed on the basis of the theory, concept, or other model, and the result of the research in the past can be moderated from an expert. But if it is only a model based on assumptions you have to store data from a real situation or try to apply in real life situations to test its suitability. Sometimes called efficiency tests.

Waro Pengsawat (2010, page 9- 11) had proposed the model creation in 2 steps as follows:

Step 1 Creating a model is creation the hypothesis model by studied the concept, theories, the research that related, the results of the study will be apply to the components factors or variables, the relationship between the factors or variables or a range before and after of each factor, by depending on the reason to be the fundamental, creation, and develop the model in a small step in this process as follow:

1.1 Study the documents and research that related for the information to analyzed and synthesized into a draft framework for research.

1.2 Study from the real context and process in several ways

         1.2.1 Study the state and problems of the current operations of The agency of the stakeholder by interview, asking, and group chat

         1.2.2 Study from case study

         1.2.3 Study from professional education

1.3 Preparation of model by taking the results of the study in 1.1. and 1.2 to define the concept of the model.

Step 2 Testing the model validity, the model that created in step 1. need to test the model validity because the model is created on a model based on assumptions, and need to check the model validity that is appropriate or not, it's a model effectively as intended or not, data collection in real or trial format in real situations to help determine the influence, or importance of small factors, or variables in the model. The person who created the model may be improved by a new model by cutting factors or variables that it's not influence or less important from the model, which will have a good appropriate model. The model test can be made four appearances:

2.1 Model test by evaluating standards that define by The Joint Committee on Standard of Education Evaluation, consists with four standards:

         2.1.1 Accuracy standard

         2.1.2 Propriety standard

         2.1.3 Utility standard

         2.1.4 Feasibility standard

2.2 Tests by educational experts to consider the profound issues in the model based on the experience of experts to consider the suggestion to have a model that can be used effectively.

2.3 Testing the model by survey the opinion of stakeholder

2.4 Testing the model by trial the model

Watchara Lawriendee (2011, pages 223-226) has proposed the creation and development of a supervision model. To study the process of research and development that designed the supervision model systematically, and will help develop the competency of teaching of the teachers and school record of students to a higher achievement. Because the operating model of supervision that comes from the

development of a system method, it is an action-oriented systems with any models developed which contain an analysis of needs, specific to the expected results. The design and development of the supervision model as well as other tools that are used in the supervision process built, developed and audited for quality as a result of the expected results. The development of the supervision model must be educated to understand the theory of communication, innovation, or techniques of new learning management, learning of adult theories, and adult development, the principle of concepts of effective supervision, and the technical and supervisory skills needed for the creation and tool development of supervision. This includes the design of learning units and the development of curriculum. The reason is that supervision is the observation of the performance of the teacher that is situated in adulthood, in order to make changes to improve and develop professionally to affect the students directly. This is the main goal of supervision. Therefore, the model of supervision development with a research plan and development (R& D) should include procedures as follows:

Step 1 Advanced analysis (Analysis - R1).

1.1 Analysis of what to expect with the truth from the basic information of policy goals that needs supervision.

1.2 Analysis of the principle, concept, practicality, and performance of supervision to improve the quality of education from current conditions and expectations.

1.3 Analysis of theories that relate to supervision to have an effective style of learning management, using effective and new theories of learning.

1.4 Analysis of current conditions of teachers and students and the expected results from teachers and students.

1.5 Synthetic expected results from learning management and supervision.

1.6 Determine the conditions of supervisors, teacher, supervision recipient and learners.

1.7 Specify the target and results that are desirable in the form of supervision.

Step 2 Design and development patterns (Design and Development: D) to draft the pattern of a master of supervision that consists of the 5 processes (Phase) as follows:

Phase 1 Preparation of giving knowledge and technical method to the teachers and supervisors.

Phase 2 Preparation of planning of supervision, the plan of learning management and collaboration between the supervisors, and the supervision recipient.

Phase 3 The performance of teaching supervision including:

3.1 Preparation before learning management and supervision.

3.2 Observe teaching in the classroom.

3.3 The meeting has to give feedback from the result from observation of the learning management.

3.4 Evaluation of supervision by monitoring the learning management of teachers.

Phase 4 Evaluation of supervision throughout the semester by compiling the school record of students, recording the plan notes of teachers, and the forms of learning management of supervisors containing:

4.1 Validation of the model of supervision by professionals.

4.2 Updated model for prototype supervision.

4.3 Development tools for supervision and arrange for the form to be used with supervision.

Step 3 Apply the model of supervision (Implementation - R2) contains the 4 important steps as follows:

Phase 1 Step of preparatory knowledge for supervisors and supervision recipients, having to prepare workshop trainings to fulfill knowledge and necessary basic skills to develop new skills that are expected from an advanced analysis of needs (Step 1).

Phase 2 Plan supervision and lesson plan together among the supervisors and teachers who are supervision recipients.

Phase 3 Performance supervision is carried out by the supervisors and teachers who are supervision recipients. They are view of the supervision plan, and the lesson plans. Teachers manage learning management and supervisors observe learning management of teachers. At the meetings feedback is given, evaluated supervision, and monitoring of the operations of all lesson plans of teachers and include the academic performance of students.

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Phase 4. Supervisio evaluation and the result of learning management through out the semester with various measurement tools.

Step 4 Supervision model applying evaluation. (Evaluation: D2). This is the step of reviewing the process, improving the master plan to oversee the supervision of all systems from the opinion of the specialist. Behavioral supervision of supervisors, behavioral learning management of teachers and the result of effective learning of learners.

From the process of creating and developing a model of supervision above, The factors of model creating and developing are 4 factors as follows:

Factor 1 The analyzed study and the synthesis of the principles of theories, concept, supervisory model, survey of current issue and educational needs.

Factor 2 Creation and evaluation of supervision models by specialist in the relevant field.

Factor 3 Try out and use the supervision models.

Factor 4 Evaluation using the improved supervision models that are develop.

The researchers will take the 4 elements above to determine the initial concept for building and developing a supervision model, and using empowerment as the base to develop the capacity to manage the learning of mathematics teachers continually in School under Office of Primary Education Service Area in Upper Northern Region

10. The research that involves using supervision models

Chumnong Tawaisin (2002) studied the behavioral development of the teaching of mathematics teachers of grade 6 by using clinical supervision and conducting research with the cycle of the operational research in 4 steps. Such as Plan, Action, Observation, and Reflect. The result of this research discovered that the mathematics teachers of grade 6 need to change their behavior of teaching mathematics to a better way. Teachers need to prepare their teaching, study curriculum documents, learn the method of measurement and evaluation, prepare schedules of teaching and writing lesson plans to use for themselves. Learning management that follows the steps of mathematics teaching of the Institute for the Promotion of Teaching Science and Technology (IPST) has to use teaching materials that relate to the content, activities and interests of the students. Promoting the discipline of students is reinforced when

students answer questions correctly or can finish their work successfully, decorating the atmosphere in the classroom that will encourages learning, have good relationships between teachers and students, and having the measurements and evaluations by various methods.

Maiyamit Pongwichai (2003) researched about developing activities of teaching that focused on the learners by the supervision process in the school, Ban Khok Nong Waeng School, Si That District, Udon Thani, by using the process of operational research of participation model in 4 steps. Such as accompanying operational planning in the planning stage (Planning), co-operation in supervision in the action stage (Action), accompanying observation of operational activities in the observation stage (Observe), and accompany inflection of operational activities in the reflection stage (Reflecting). The result of study discovered that teachers can improve and develop teaching that is suitable in many ways with the nature and needs of different learners. Starting from an analysis of the individual students, research and analysis curriculum, writing of detailed of lesson plans, and clearing all of the factors . Teaching activities that are diverse, challenge the capacity and stimulate the attention of students, are reinforced with the learner continuously. Thus preparing the students to learn from practice and take part in all activities. Then using appropriate media that conforms to the contents, measurements and evaluations using many methods to meet the actual conditions. Teachers have to prepare the teaching activities that motivate the learners to know about analysis, synthetic thought, creativity, solving the problem and making a decision.

Pranom Promkate (2007) researched the results of supervision of peer support, to develop capacity of learning management by using the techniques TAI (Team Assisted Individualization) jointly with question set of KWDL (K means What we know; W means What we want to know; D means What we do; L means What we Learn) of mathematics teachers. The results of the research discovered that:

1. After obtaining supervision of peer support, teachers are more knowledgeable about supervision and learning management.

2. The capacity of learning management with TAI techniques jointly with KWDL techniques discovered that teachers have the ability to write lesson plans and are capable of learning management with TAI techniques jointly with KWDL techniques at a high level.

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3. Teachers have commented that supervision of peer support is suitable for the conditions of learning management in schools, and have the opinion that the learning management with TAI technique joined with KWDL techniques are suitable for teaching mathematics.

4. The results of learning about the problem of students in grade 3 and students in grade 6, before and after learning with TAI techniques jointly with KWDL techniques, overall, discovered that it's a different level of statistical significance in ? both or each? level.05.

5. Overall, the students agree with learning management using TAI technique jointly with KWDL techniques.

Pairaw Phummun (2009) researched about the supervision model of empowerment to reform the whole school learning in basic education of supervisors under office of SuphanBuri primary Educational Service Area office 1 and has listed the operational process of supervision in 7 steps such as, Step 1: Co-building awareness; Step 2 : Co-searching & analyzing; Step 3 : Co-perception of targets; Step 4 : Co-development activities; Step 5 : Co-learning and problem solving; Step 6 : Co-organizing knowledge; Step 7: Co-appreciation and social communication.

1. Management discovered that assigning the task of teaching directly with knowledge, and the ability of individual teachers. Teachers are satisfied because they have time to prepare more instruction; the community is satisfied with the school after reforming the learning on many levels. Supervisors, administrator, and teachers have the opinion that the supervision model of empowerment is appropriate and has satisfied the highest level.

2. The Learning management: 1) the effect on the teacher discovered that teachers have the habit of teaching which focuses on the learners at a high level; 2) the effect on the students; it was discovered that the achievement of the students on average did develop more skills. Students with learning behaviors that used a way that focused on the learner and created a good attitude towards learning and school at a high level. Student behavioral characteristics are good and happy. There were good results, and the characteristics were smart and at a good level. Parents were satisfied with the behavior of the students, and its nice features, smart, and enjoyable at a high level.

3. Internal supervision discovered that the teachers are satisfied with the supervision process.

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4. Performance of community relations discovered that schools can lead the communities to join with the development of learning and allow the students to learn about the learning community.

The research involved with using a model of supervision concluded that there are 2 dimensional element as follows:

1. Supervision process dimensions discovered that there were 3 main stages of the supervisory process. The preparation of supervision, the procedures for supervision process, and the process of supervision evaluation.

2. The effective of supervision is as follows:

2.1 The effect on supervision recipient, such as supervisors who can help teachers whose supervision recipient are knowledgeable and have the capacity to perform more. Supervising teachers are satisfied to have been supervised or receive assistance in the performance from supervisors.

2.2 The effect of the performance of teachers whose supervision recipient, such as students, have the capacity to learn more and there is a satisfaction in the learning management of teachers.

2.2 Empowerment

2.2.1 The meaning of empowerment

Scott and Jaffe (1991 p.16) said that empowerment means targeting, creating strategy formulas, and putting plans into action in order to make workers in the organization responsible in the job. Motivate works by decentralizing decision-making from the center, including linking with features, as well as attitude and the ability of individuals or within the team. It developes compatibility with enterprising environments by providing the power and opportunity to personally show the potential for continual change in the level that the organization wants.

Random House Value Publishing (1996 p.468) states the meaning of empowerment in Webster's Encyclopedic Unabridged Dictionary 2 as follows:

The first definition of empowerment means giving the power or authority to the person and the right and influence to dominate others. They can make other people follow what they want within the scope of authority that a person has."

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The second definition of empowerment means enabling or providing power that makes individuals able to act in accordance with the individual capabilities or act with another person who is capable of it.

Sumalee Khunchandee (1998, page 63) said that empowerment means, the strategy of targeting process, and implementing them into action in order to work in the organizations part of the operation, to have an effective yield and achieve the organizational goals.

Zimmerman (2000 p. 45 - 46) defines the meaning of empowerment in 3 definitions as follows:

The first definition of empowerment is a process of improvements to enhance the operational effectiveness of the organization continually by developing and increasing the potential of those operations and teams, with a comprehensive range of different ways that cover the scope and all of the working conditions of the organization.

The second definition of empowerment as the result means; the potential that a person who has empowerment derived from self-development until they have a sense of confidence and self-efficiency. Having a freedom, knowing the value of life, and who can make decisions and manage their own work successfully as intended.

The third definition of empowerment as a productive means; the level of resulting from the potential of the individual and teams in organizations which if given the power, the performance of both individuals and teams will increase and the result will be increased productivity of the work.

Newstrom and David (2002 p. 185) defines empowerment as; the process that gives great power to the worker through the sharing of important related information and arrangements to control the factors that affect performance.

Nittaya Sangwong (2002, page 72) said that empowerment means; the process of increasing staff ability, self-confidence, and awareness of that ability. It can operate effectively and achieve both personal and organizational benefits.

Somchai Boonsiribhasuch (2002, page 65) said that empowerment means; the process of actions or procedures to support what is an aggravating factor, situation, or various methods that help staff to perform the things that has developed their powerful performance. The working behavior or works that show development of power of ability that cause that is beneficial to individuals and organizations.

Jaruwon Siparatana (2548, page 45) said that empowerment means; the process of change, development, participation, and increasing the work force within the person(s) with the support of what is an aggravating factor. Various circumstances that help individuals or person(s) to discover their potential and develop the ability to work more effectively by changing the way to think and to do a new thing as well as realize their value.

Therefore it is concluded that empowerment means the process of management of the individual or organization that is helping staff to develop and realize their value. To have confidence in their own capacity, to strengthen morale and create a good culture in corporate performance for the implementation of the organization's mission effectively. Management in a manner of thinking in a positive way, about the behavior of operation, workings, and the development of the talent which bring benefits to the staff and organizations.

2. Concept and theories related with empowerment

Empowerment is a process that demonstrates the interaction of individual factors and can develop the power to be used for the operation to succeed. So, empowerment related with various theories as follow.

2.1 Self-control theory of Kouzes & Posner (1995 p. 184). The self-control theory believes that the features that appear to come from inside the power to influence decisions, determine the actions that affects the work, and uses these reason for operation. The actions that show that people can control themselves such as: determine lifestyle and behavior of their own, make decisions to do anything rationally, and can demonstrate existing capacity of their own. That they can collaborate with others, be patience, and ready to accept change and other crises. Self-control is a fundamental property of empowerment in the working environment.

2.2 Self-determination theory of Borich & Tobari (1995 p.242). The self-determination theory has the fundamental belief that people have 3 needs as follows:

2.2.1 Competence Needs; a person needs to have the capacity to learn and practice a skill that will lead to the destination.

2.2.2 Relationship Needs; a person needs to have relationships that lead to a safe workplace, and a good working relationship with colleagues and stakeholders.

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2.2.3 Autonomy Needs; a person needs independence. In a new initiative to be given control in every action on their own, the autonomy needed will give significance about the person. That they have the capacity to think and make a decision and determines their action plan. They can be aware and understand their situation to be creative, and use resources for the benefit of the work. Meanwhile, they would be ready to accept the consequences. The process of operation of theory will focus personnel to express their potential, their capacity, to make choices, and have the right to choose their own practice with awareness of obligations and circumstances. Self - determination relies on the capacity of individuals in various combinations for example; They can think critically, determine and target the needs and plan interventions. These can be analyzed, bringing separated resources to the application, using reasoning to choose to practice, evaluation operation, creating good opportunities and helping to consistently move towards the goal.

2.3 Goal Setting Theory of Hoy & Miskel. (2001 p. 126 - 137), It is believed that individual goals are important to consider before using any methods to develop the empowerment of teachers and staff. The main ideal of goal setting theory is the values and decisions about the value of a person's actions in relation to the goal. Thus, the actions of individuals is the way that leads to a goal. The goal is a virtual media center, of coordinating wishes, value, and the decisions on the job, using feedback, and information guides. There is power in the staff that shows the result of the achieved level in relation to the goal. The feature of the target and conditions that affect the success of the practice as follows:

2.3.1 Specific goals, as opposed to vague goals, can make person(s) successful.

2.3.2 Difficult and/or challenging goals will make personnel more energetic and willing to perform better than an easy goal.

2.3.3 Clearly defines goals will contribute to the achievement better than goals that are not defined.

2.3.4 Getting feedback about achieving performance goals will have a positive impact on the performance of colleagues.

2.3.5 Setting good goals in reasonable period of time allowing for successful evaluations.

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2.3.6 The practitioner sees the value and commitment, which shows dedicated to the goals.

2.3.7 To have the supports of many factors in practice will help to empower the worker to achieve the goal.

2.3.8 Confidence in the ability of themselves will make the person have the opportunity to implement the goal.

2.3.9 Awareness of duty, the cooperation of all parties that are involved with helping to remove the problems and to strategize the work. This should be promoted to achieve the goal.

2.4 Equity Theory of J. Stacy Adams that developed in 1965, presented by Hoy & Miskel (2001 p. 143 - 157). The equity theory is believed that people can recognize practices that have equality or not. This will affect the performance of that person. Its effect on the people who respond with the equality that has been in 3 appearances as follows:

2.4.1 Benevolent.

2.4.2 Equity Sensitive.

2.4.3 Entitled.

So, people should be treated equally, in compensation and privileges in appropriate portfolio performance, or legal status of a person that all parties agree and accept the value of the membership and respect each other. Treated with equality in various fields at work, this is another factor that is important in strengthening the work of personnel.

2.5 Guidelines for empowering the work of Prawat (1991 p. 748 - 749) such as: giving the freedom to control their own work, eligible to make comments, having a choice in the practice, have the opportunity to specialize in their work, evaluating their own work, and having supportive resources.

2.6 The concept of empowerment in the work of Kanpol (1999 p. 52), Suggests that empowering the teachers will have 3 elements as follows:

2.6.1 Giving the teacher the authority and the power to decide.

2.6.2 Giving the teachers freedom and allowing them to control the job as an expert.

2.6.3 Giving information about sexuality, nationality, social status, and culture. These are helpful for the teachers to improve curriculum accordingly for the learner.

2.6.4 Giving the teacher the right to comment on students work.

2.6.5 Giving the teacher the option to self-evaluate.

2.7 The concept of empowering the teachers work of Klecker & Loadman (1996 p. 10), which suggests that the research of empowering of teacher work by observing the behavior and capacities as follows:

2.7.1 The capacity to transfer knowledge and security as a professional.

2.7.2 Capacity to counsel and advise new teachers to improve their skills and their capacity to work.

2.7.3 Knowledge and skills in the subject(s) and the performance of teacher profession.

2.7.4 Capacity to work together to develop learning and teaching in schools.

2.8 The concept of the practice that is the empowering the teacher work of Terry (1999 p. 5 - 6) were as follows:

2.8.1 Having the trust, reasoning, and management control of using resources will be of a benefit to them.

2.8.2 Synchronizing the vision of the person and schools, consistently to put into practice.

2.8.3 Seeing the value of teaching as a job that requires expertise and professionalism.

2.8.4 Not being afraid of the difficulties of work. Able to plan, practice and develop an empowerment model for them to develop their job.

2.8.5 Recognition of the virtues, knowledge, ability and the performance of colleagues who are ready to develop to become better.

2.8.6 The effort to do the mission of the school to achieve the goal.

2.8.7 Setting goals for work with engaging ideas, decision-making and ownership together.

2.8.8 Working together as a team.

2.8.9 Collaborating with colleague for resources.

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2.9 The concept of empowering teachers work of Blasé &Blasé (1994 p. 1) were as follows:

2.9.1 Allow the teachers to be involved in the administration of the School.

2.9.2 Trust in knowledge, ability, and the professionalism of the teachers.

2.9.3 Manage the organizational structure to facilitate the work of the teachers.

2.9.4 Sufficiently support the resources that are used by the teachers.

2.9.5 Building an environment that contributes to empowerment of teachers.

2.9.6 Encouragement teachers to use their efforts to overcome barriers at work.

2.9.7 Accepting the value of the teacher's work.

2.9.8 Training teacher's with problems solving skills.

2.9.9 Promoting teacher leadership.

2.9.10 Reinforcing to teachers that they have freedom to use innovation in performance.

From the study about theoretical concepts that relate to the empowerment of the performance in 9 theoretical concepts, four factors are showed in table 1:

Table 1 Show the factors of empowerment in practice

Theory concepts	The recognition of learning management data	The knowledge and the capacity to create a learning management	The learning management reinforcement	The Recognition of self–esteem and learning management capacity
1. Self – Control Theory of Kouzes & Posner.	- To determine lifestyles and behavior. - Understand the reason of the action.	- Research and building the capacity of their own to take action.		- Can collaborate with others.
2. Self-Determination Theory of Borich &Tombari	- To know and understand the work status. - Have rational choices.	- Create learning and practice the performance skills. - To define planning and performance goals on their own.	- Giving the freedom and Do not dominate thinking.	- There is a friendly atmosphere.
3. Goal Setting Theory of Hoy & Miskel.	- Create awareness of the goals of the operation. - To recognize and realize the function.	- To set goals and performance methods.	- Supporting the necessary things. - Have information and guidance. - Equally feeling.	- Seeing values and commitment to the goals of the operation.
4. Equity Theory of J. Stacy Adams, presented by Hoy & Miskel.		- Evaluate their performance.	- Receiving compensation properly. - Supporting the resources.	- Respect to each other. - Promote creativity to join the operations method together. - A feeling of been valued and capable.

Table 7 (continued)

Theory concepts	The recognition of learning management data	The knowledge and the capacity to create a learning management	The learning management reinforcement	The Recognition of self–esteem and learning management capacity
5. The concept about the empowerment of work of Prawat		- Evaluate their performance. - Create knowledge that relates to performance.	- Giving the freedom to control their performance. - Giving the freedom to control their performance. - Giving the freedom to decide on the operation.	- Receive the opportunity to show their capacity. - Promote participation in decision-making ideas.
6. The concept about the empowerment of the teacher work of Kanpol.	- The recognition information that related to performance. - Promote reflection of actual performance.	- Evaluate their performance. - Strengthen the knowledge in content and capacity to transfer knowledge. - Building efforts in the performance mission of academy.	- To get the consultation to develop operational performance. - Have a joint goal that is defined. - Supporting the necessary things.	
7. The concept about the empowerment of the teacher work of Klecker & Loadman	- Coordinate the vision of personnel and the school to integrate.			- Working with others.

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Table 7 (continued)

Theory concepts	The recognition of learning management data	The knowledge and the capacity to create a learning management	The learning management reinforcement	The Recognition of self–esteem and learning management capacity
8. The concept about practice of the empowerment of the teacher work of Terry.	- Suggests value of teaching jobs.		- Giving the trust.	- Accept each other capacity. - Teamwork
9. The concept about empowerment of teachers working of Blasé & Blasé.		- Having the training to have the skills and capacity to solve problems. - Have an opportunity to use innovative ideas for the operation.	- Supporting the resources. -Promote the teacher to have freedom in the operation. -Giving encouragement for the operation.	- Promote involvement in the decision of the administration of the schools. - Promoting leadership of teachers. -Accept the value of teacher's work. - Trusting about the capacity and knowledge the professionalism of teachers.

From table 1, see that the theoretical concepts that are related to the empowerment all of the 9 theoretical concepts have 4 factors in common such as:1) perceiving the performance data, 2) the ability to operation, 3) Motivation, and 4) Feeling valued and capable. Each element has several methods. This research will be used as the initial concept to integrate with the principles of supervision concepts for creating and developing the supervisory model in the future.

3. The results of teachers empowerment.

Blasé & Blasé (1994 p.7) mention the power of work that affects the performance of the teachers as follows:

1. Helping expand the ability of teachers.

2. Give teachers the freedom to reflect the reality and operation of management awareness.

3. Helping to boost self-confidence to perform the duties of a teacher.

Goens & Clover (1991 p. 233) said that the characteristics of teachers in schools that have the power to work is as follows:

1. Gives stability in the performance according to aptitude and specialization.

2. Gives ethical standards in performance.

3. Gives the authority and independence in the work, giving responsibility and capacity to monitor performance.

4. Gives time to consider the effects of the performance and think about what needs to be done for education.

5. Gives performance and development work standards as educational experts.

6. Gives ability levels, authority, freedom and responsibility to the corresponding balanced to give performance result completely.

7. Gives determination of work, monitoring expertise, as well as other professional organizations.

Clutterbuck and Kernaghan (1994 p. 52 - 53) said that personnel who have been empowered will have the power to work by this features as follows:

1. Able to be trained well.

2. Gain more confidence and self-reliant.

3. Be encouraged to strive to work with greater realization of their duties.

4. Able to use their creativity, and develop manual work skills.

5. Able to have responsibility in participation in the work place.

6. Able to communicate demands successfully, discuss issues, and share the ideas and vision to others in an understandable and recognized way.

7. Able to work alone or in conjunction with others as a team.

8. Have flexible work responsibilities, and be ready to face and solve problems.

9. Able to determine when it is time to decide, at an appropriate time when have to deal with others.

10. Builds trusting relationships.

11. Holds the principle of harmony, and unity within the team, as it is organized.

12. Comfortable in their status within the organization.

13. Understand the context and the consequences of their work, able to solve problems on their own and help to suggest ways to solve the problems.

14. Able to self-manage by defining the priority of tasks.

15. Able to control the environmental conditions in the workplace.

16. Able to improve processes as needed.

17. Receive knowledge about the job that they are doing very well.

18. Know the customer clearly both inside and outside the organization.

19. Love to learn, seek new things to develop their skills all the time.

20. Willingness to change and improve continuously.

21. Accept feedback and learn from it.

22. Ability to learn from the experience of reflection.

The synthesis of ideas about the results of teacher empowerment discovers that that to have good results, 2 things are needed:

1. The effectiveness for teachers is the reinforcement feature that is appropriate for teacher operation, because the teachers having been empowered, will have a feeling of satisfaction as they have developed intelligence, skills, ability, progression, a tolerance for error and striving to work, (Weightman, 1999 p. 137) Goens & Clover (1991 p. 228) said that, the personnel who have empowerment to work, will feel that a way of life depends on what they do because they are the people who receive the consequences of their actions. Personnel who have been empowered to work will understand the meaning, the significance of work, work for achievement, the pace to reach the goals, regarding as commitment to provide for their own, and to know what to do and how to do it.

2. The effectiveness of schools to make the models or guidelines for operation in the schools in an appropriate way. Even though the empowerment of the work will depend on the performer as individuals, but what appears to others will be recognized in the form of behavior and performance. Personnel who have been empowered to work

will be responsible in their duties, self-confidence, generous, and have a good relationship with each other. They will have loving fellowships, and trust each other. This will make the environment conducive to performance. By creating awareness in the workplace for achieving the goals of the organization

The study of concepts and research of educators can results in empowerment That happens to the teachers above. The researcher believes that if supervision of the mathematics teacher using the empowerment model in the basic role of the researcher will be an effective for the teachers and schools that are able to manage education to a better quality. In the words of Fisher (1993 p. 1); Mc Shane & Glinow (2000 p. 314); staff who have been empowered will been enthusiasm, and be ready to work, with morality and responsibility. And will be satisfied with their work, confident in their duties towards the goal, and able to produce quality work consistently with Garrison & Bly (1997 p. 113) and Aom- aari Suwansri (2010, page 25) who said; the achievement of empowerment in the work of teachers will reflect the achievements of learners with quality and the satisfaction of their parents.

4. Research related to empowerment

Tawee Promminta (2001) studied the effects of teacher empowerment by developing capabilities about action research in the classroom based on the concepts of cooperation: With an integrated method, the results discovered that 1) 66.84 percent of Teachers have a research experience. For 81.98 percent of them have classroom action research training experience, and 56.57 percent of them want to have research training. The research model is officially for 70.10 percent, and for the individual research for 78.10 percent. The most model were cooperation between the personnel in the school. 2) The teacher empowerment process using the methods of description, give knowledge and support, and assist teachers to do the performance research in the classroom. 3) After the empowerment of teachers in schools, a case study will be made, and the research on more than 50 percent. Each school has no formal research of more than 60 percent. The feature of individually research of more than 70 percent. The cooperation model of the research will discover the collaboration between internal people within the school, without external person assistance.

Somchai Boonsiribhasuch (2002) studied the empowerment of teachers working in secondary schools, Education Region 8.The results of research discovered that, 1)

fundamentals factor of teachers were at a good level. 2) Empowerment of teacher's work has a relationship with all the fundamental factors of teachers, and all the process of empowerment.3) The fundamentals factor of teachers could explain the difference of the empowerment of teachers work by more than 50 percent.4) City School District discovered that only the self-evaluation process, available for audit was able to increase the empowerment of work. But in the countryside schools districts the process of empowerment had a different statistically significant factor when combining all of schools together, the results matched as well the analysis of the schools in the countryside schools districts.

Piyathida Worrayanopakorn (2003),studied on the development of indicators, including the empowerment of teachers in the department of basic education. The results discovered that the empowerment of teacher consists of 2 dimensions (Processes and results) 13 factors and 102 indicators, prioritized by weight of factors are as follows: Job satisfaction, creating leadership, team building, commitment to the teaching profession, professional advancement, independence, providing of opportunities, participation in decisions, create motivational teacher status, self-confidence, sponsorship, and self-esteem. The results verify and validate the indicators of the empowerment of teachers having the chi-square = 27.51, df = 61, p = 1.00, GfI = 1.00. AGFI = 1.00, Standardized RMR = 0.01, RMSEA = 0.00.this means the indicators model combines empowerment of teachers and has validity.

Prawit Erawan(2005), studied the empowerment model of teachers in schools: Case study from Mahasarakham University Demonstration School (Secondary), the results of research discovered that the empowerment of teacher models has 7 factors. 1) Restructuring the management that focuses on decentralized decision-making to group learning.2) Implementing new work.3) Increasing the bargaining power of teachers in a seminar substances (dialog) to reduce conflict and build understanding.4) Creates an atmosphere for open communications and to be done democratically between teachers and administrators.5) The development of knowledge and new skills for teachers.6) Creates a team to place in the group of learning, and 7) Build motivation in the work. These needs will be the program of empowerment of teachers that is consistence with the method. These comprise inserting supplements of6 methods such as: A personal level using training operations skills and consulting at work, empowerment in the team

level, using the method for meetings with the teams in diagnosed conditions, and meetings to create the team that will solve problems in the schools level using the methods of a consultative meeting, and meetings to plan the system to control the quality of the school. Which the evaluation results of changing the results-oriented discovering that the empowerment of teachers increase several indicator.

Jaruwon Siparatana (2005),studied on the development of empowerment work model for potential development for researchers of kindergarten teachers, with 4 principles of the models as follows:

1. Encouraged to know and understand themselves.(Self – awareness)

2. Encourage building a team and teamwork.(Team Building & Teamwork)

3. Encourage learning from doing performance research in a class by themselves.(Authentic Learning)

4. Encourage participants to use reflection. (Reflection)

The results of research discovered that

1. Potential of researchers of the kindergarten teachers consisting of 6 ways such as: the seeking the knowledge, the understanding about methodological research in the classroom, the idea, the knowing and understanding oneself, the learning management, and communication.

2. Giving the empowerment working model for potential development of researchers of kindergarten teachers that developed in 4 styles such as: encourage teachers to know and understand themselves, encourage teachers to build teams and teamwork, encourage teachers to learn and develop themselves by doing operation research in a class by themselves, and encouraging teachers to learn self-reflection. The process of learning has 4 steps: the experience, the presentation, the discussion and summary, and the reflection of thinking.

3. The experimental results by using the empowerment working model for potential development researchers of kindergarten teachers discovered that.

3.1 Kindergarten teachers have an average score of self-awareness about the potential of the researcher in all aspects. After experiment the score was higher than before the experiment at the significance statistical level of 01.

3.2 Kindergarten teachers had an average score of self-awareness about the ability in empowerment to work by oneself. After experiment the awareness was higher than before the experiment at the significance statistical level of 01.

3.3 From the actual assessment it was discovered that kindergarten teachers had potential as researchers in all aspects and were capable of empowerment to work in accordance with their own self-awareness.

Sirirat Julsorn (2007) studied the empowerment of teachers of administrators that affected the results of the work and the progress of the operation of the officials. Silpakorn University by using the theory of Stephen R. Covey. The results discovered that1) The empowerment of the executive level in six conditions for the overall was the middle. 2) The level of achievement and the advancement of the official supporting line in overall was in the middle. 3) Empowerment of the executive that affect the achievement of the work and the advancement of the operation of government support such as: Skills (Communications, planning and management, solve the problem with the system), characteristics(Honesty, maturity, and generosity), the promise of success (Assignment Plan, indicative operations, resource assignment, checking determination and a summary of the operating results.)

Somjit Songsarn (2009) studied the development of the linear, structural relationship model of factors that influence the empowerment to work effectively for teachers. The results discovered that.

1. Linear structural relationship model of factors that influence the empowerment that work effectively for teachers. The researchers developed a harmony with the empirical data (Chi-square = 30.10, the degrees of freedom (df) = 24, the probability (P-value) = 0.18,index GFI = 0.99, index RMSEA = 0.024, and CN = 627.94)

2. Factors that have direct influence, indirect influence, and including influence to the empowerment to work effectively for teachers by ordering influential coefficient from descending were as follows:1) Direct influence has 3 factors: To create motivation to work, creating an organizational atmosphere and leadership2) indirect influence by the transmission of creating motivation to work. There are 2 factors for creating leadership and creating organizational atmosphere and 3) Including influences have 3factors. They are motivation to work, creating leadership, and creating an organizational atmosphere.

Om-aree Suwannasri (2010) studies the empowerment development strategy of teachers at private school; the result of research discovered that.

1. The empowerment level of teachers in private schools on 4 dimension of beliefs, an overview in all sizes of schools at the high level. When considering each dimension it can be sorted as follow. 1) Dimensions of beliefs affectively. 2) Dimensions of beliefs meaningfully. 3) Dimensions of beliefs about performance. 4) Dimensions of beliefs about freedom. Empowerment teachers in private school that administrators use are eliminating the conditions that make the empowerment of teachers lower and encourage teachers to recognize performance, the issue of empowerment that comes from the teachers, environment and Executives.

2. Strategic empowerment of teachers in private school consists of strategies to eliminate the conditions that make the empowerment of teachers lower such as: strategies to build the organization of learning, strategies to build success in the teaching professions, strategic to build awareness, ownership and strategies to encourage teachers to get better performance such as: strategies to promote teamwork, strategies to build platform potential of teacher and strategy to build morale.

Yuwathida Chaphanya (2011) studied on the empowerment of teachers in primary schools: Dimensions in features that have meaning to the people in differential phenomenon. The results of research discovered that the empowerment of teachers is meaningful to those who are in the phenomenon as the promotion process to encourage the teachers to develop their potential and ability in order to operationally achieve the goals. Because of their motivation to work, developing potential and believing in their potential, that their own work can be accomplish by the teachers that are aware of the power to control the factors that are involved, and having the freedom to decide to work towards the goal of the empowerment of teachers, in 3 appearances to achieve the potential development of teachers. In the development of the quality of education and acceptance of the personnel in the operation. The empowerments of teachers is divided into 2 categories. They are the empowerment of the teacher's structure, and the empowerment with the teachers in mind. Nine methods mentioned were: The potential development of teachers, support of the resources and information needed, assignments, coaching, participation, promoting teamwork, creating leadership, building motivation, and to promote an atmosphere of cooperation by using the 5 processes consist with building awareness. Planning the goals together, assignments, follow up work, and a reflection of the performance. This is particularly relevant to people both inside and

outside the school. Both directly and indirectly it effect such as: teachers, administrators, colleague, community, County Office of Education, and school networks.

Schwartz (2001) studied the empowering teachers for the feasibility of implementation in the classroom. The results of this research discovered the picture of the pyramid model of empowerment such as: The ability to participate in the decision, professional advancement, the status of teachers, the self-confidence of teachers, an independent impact, bearing responsibility together, the effectiveness of cooperation, and the empowering of students by creating a commitment and effectiveness of team collaboration. It also suggests that teachers should be encouraged to choose their own team. Administrators should allow teachers to work together with a unification model more than to divide teachers into different levels. This will lead to a coordinated effort to contribute towards empowerment.

Bogler and Somech (2004) studied the results of empowerment teachers that were engaged with the organization. Professional commitment and behavior in the schools that is desirable to the organization, was studied from teachers who teach in secondary school and high school, in Israel. For 983 students, the results of research discovered that 1) the level of the perception about their own power, and having a relationship with emotional ties to the organization, a professional commitment and a desirable behavior in schools.2) The advancement of the profession, performance and the status of teachers, can predict organizational commitment and professional commitment. At the same time the capacity to decide, the capacity of performance, and the status of teachers, can predict the desired behavior of the organization.

Research studies that related to teacher empowerment have discovered two groups of dimensions as follows:

1. Dimensions about the factors of empowerment and empowerment methods are: Participation in the decision, professional advancement, the status of teachers, self-confidence, independence in operation and self-evaluation, motivation, the leadership status of the organizational atmosphere, knowledge and skills that relate to performance, self-awareness and understanding in themselves as teachers, teamwork, and the supporting factors that are required for daily operations.

2. The dimensions about empowerment results are: Efficacy and the capacity to perform increasingly well, Teachers were more satisfied with the performance, and student achievement and the desirable increases.

The study about the principle concepts that related with educational supervision, and the principle of empowerment theory concepts, show that researchers should be integrated to create a framework for empowerment – based supervision model, to develop the capacity for learning management of mathematics teachers. The operational supervision were by 3 factors as follows: The supervisory arrangements, supervision operating, supervision reflections, and by using the guidelines. There are 4 factors of empowerment as follows:, 1) The recognition of learning management data. 2) The knowledge and the capacity to create a learning management. 3) The learning management reinforcement. And 4) The Recognition of self – esteem and learning management capacity. By the model of the empowerment – Based supervision to develop the capacity in learning management of Mathematics teachers, School under office of Primary Education Service Area Office, Upper Northern Region, for the future.

2.3 Documents about mathematic content group according to the Core Curriculum for Basic Education Act 2008

Academy Department, Ministry of Education (2008, pages 2-57), determined the learning of the mathematic content group according to the Core Curriculum for Basic Education, 2008 as follows:

1. Learning vision

The education of mathematics for the Core Curriculum for Basic Education Act 2008 is education for all people that gives an opportunity to young people to continuously learn mathematics, for their entire life according to their potential. In order for youth who have enough knowledge in mathematics, and can take this knowledge, of mathematical skills and the processes that are necessary to develop a better quality of life. This includes being used as a tool to learn different things and as a basis for further study. Therefore, it is the responsibility of the schools to provide learning that is suitable for each student in order to meet the learning standards that are already defined. For students who have a mathematical ability and want to learn more mathematics, it is the duty of the schools to organize teaching for students, to give them the opportunity to learn more mathematics according to their skills and interests, and to provide learners with knowledge that is equal with international civilized countries.

2. Quality of learners

    2.1 Students who have finished grade 3 should understand numerical counting from at least 0 to 100,000, the implementation of a number, ability to solve problems of addition, subtraction, multiplication, and division together with realizing the reasonableness of the answer. They should understanding about length, distance, weight, volume, capacity, time, and money so that it can be measured accurately and appropriately. They should have knowledge to solve problems in different situations, understanding the triangle, square, circle, oval, rectangular, sphere, and cylinder. They should understand the decimal points, the parts of a straight line, radius, straight line, angles, and patterns and explain correlations, data collection, and classify information about themselves and the environment around them that they see in their daily lives. They should discuss various issues from the pictograms and bar charts using a variety of solutions, using knowledge, skills and processes of mathematics to solve problems of different situations appropriately. They should give reasoning attributed to decisions and summarizes properly, using language and mathematical symbols to communicate, interpret, and present correctly. They should link all of the knowledge in mathematics and link mathematics to other sciences creatively.

    2.2 Students that have a completed grade 6 should have an understanding and feeling of numbers. The ability of numerical count and zero, fractions, fractions not more than three decimal places, percentages, the implementation of a number, and properties of the number. They can solve problems of addition, subtraction, multiplication, and division, numeral, fractions, fractions not more than three decimal places, and percentage, together with realizing the reasonableness of the answer. They can find an estimate of the numeral and fraction not more than three decimal places, have understanding about the length, distance, weight, area, volume, capacity, time, money, direction, diagram, and the size of the angle. They can measure accurately and appropriately. They have the knowledge to solve problems in different situations. Understanding about the properties and characteristics of the triangle, square, circle, rectangle, cylinder cone, prism, pyramid, angle, and parallel pattern. They can explain correlations, solve problems with forms, have the ability to analyze the situation or problems in writing in the form of a linear equation with an unknown and solve them. They can perform data correction, discuss various issues from the pictograms, bar chart,

comparison chart, pie chart, line graph, and tables, also presents information in the form of pictograms, bar chart, comparison chart, and line graphs. Using knowledge about the probable preliminary estimates of the occurrence of the events, using a variety of solutions. They can use knowledge, skills and mathematical processes with technology to solve problems in different situations appropriately. They can give reasons attributed to the decision and summarize the results properly, using language and mathematical symbols to communicate, interpret, and present appropriately and correctly. They can link all knowledge in mathematics, and link mathematics with other sciences, with creativity.

        2.3 Students that finish grade 9 should have an abstract notion about real numbers, understand about ratio, proportion, and percentage, exponential and integer exponents, square roots and cubed roots of real numbers. They can manage integers, fractions, decimals, logarithms, square roots and cubed roots of real numbers, using estimations of actions and solutions, and having knowledge about the number to use in real life. They understand about the surface area of the prism, cylinder, and volume of prisms, cylinder, pyramid, cone, and sphere, choosing the unit of measure in various systems about the length of area and volume appropriately. They can use together with the ability to gain knowledge about measurements to use in real life. They can create and describe the process of creating two-dimensional geometry by using dividers and a straightedge, to describe characterization and properties of three-dimensional geometry such as: prism, pyramid, cylinder, cone, and spheres. They can understand about the properties of congruence and similarities of triangles, parallel, Pythagoras's theorems. They are also able to take those properties and give reasons and solve problems with the understanding about geometric transformation. About translation, reflection, and rotation, and how these can be applied. They can imagine and describe characterization of two-dimensional and three-dimensional geometrical shapes. They can analyze and describe the relationship of the pattern, situation or problem. They can use a single variable linear equation, system of linear equations with two variables, one variable linear inequalities, and graphs to solve a problems. They can define the issues, write questions about the issue or situation, determine the educational methods, data collection and present the data by using a pie chart or other suitable form. They can understand the meaning of data about the mean, median, and mode of data that does not

have the frequency distribution, and can choose to use appropriately. They can use their knowledge to consider the statistical information, understand about the randomized trial, event, and the probability of the event. They can use their knowledge about probability for the forecast and decision making in various situations. They can use a variety of solutions, use knowledge, skills and mathematical processes, with technology to solve problems in different situations appropriately. They can give the reasons attributed to the decision and summarize the results properly, using the language and mathematical symbols to communicate, interpret, and present the results correctly and clearly. They can link all of their knowledge in mathematics and apply knowledge, principles, mathematical processes associated with other sciences and do so creativity.

    2.4 Students finishing grade 12 should have an abstract notion about the real number system, the absolute value of real numbers, and the real number in the form of square root and the real number in the form of exponents with rational exponents. They can estimate the real numbers that are in the square root form, and the real number in the exponent by using the appropriate calculation method. They can also apply the property of the real number to use their knowledge about trigonometric ratios to estimate the distance, height, and solve problems about measurement. Have concept of set and their operation, and use their knowledge of the Venn diagram − Euler to show sets, and to solve problems and check the reasonableness while giving a reason, They can show understanding, and give inductive and deductive reasoning, about abstract notions, relationships, and functions. Students are able to use relations and functions to solve problems in different situations. They are able to understand the meaning of arithmetic sequence, geometric sequence, and can evaluate these general terms. They understand the meaning of the sum of n in the first term of the arithmetic series, geometric series, and evaluate a sum of n in the first term of arithmetic and geometric series by using formulas and applying them, to know and understand how to solve equations and inequality variables no more than two degrees. This includes the using of a graph of the equation and inequality, or functions in the solution, and understand the methods of an opinion poll easily. They can choose the medium best suited for their data and purpose. They can evaluate mean, median, mode, standard deviation, and percentile of data. They can analyze data and take the results from the analysis of data to help make decisions. They can understand the randomized trial, event, and the probability of

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the event. They can use their knowledge about probability in the forecast attributed to a decision and solve problems in different situations. They can use a variety of solutions, use their knowledge, skills and mathematical processes with technology to solve problems in different situations appropriately. They can give the reason to make decisions and summarize the results properly, using language and mathematical symbols to communicate, interpret, and present their findings correctly and clearly. They can link all of their knowledge in mathematics and apply this knowledge, of the mathematical processes associated with other sciences, and do so in a creative way.

3. Strands

Strand is defined as the main point, and it is necessary for all learners consistent with mathematics content and with mathematical process skills. In learning management, teachers should integrate different topics together as much as possible. The strand of mathematics content group consists of:

Strand 1 Number and Operations

Strand 2 Measurement

Strand 3 Geometry

Strand 4 Algebra

Strand 5 Data analysis and Probability.

Strand 6 Mathematical skills and process

2.4 The concept of mathematics learning management

1. The definition of learning management

Learning management or teaching is an important step of curriculum implementation which many educators have given meaning to according to the changing times as follows:

Aorathai Moonkham and Suvit Moonkham (2001, page 11) said that learning management means organizing the experience, activities or any circumstances that are meaningful to students, with the students taking action and interacting with these things on their own. Analysis, summarization, and performance by observation, in order to create definitions and a production of knowledge by oneself will make learning of all aspects to be in a balanced way.

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Arphon Jaithiang (2003, page 72) said that teaching means the operation process that is held in partnership with the teachers and the students to make the learner have a behavioral change for specified purposes. These have to rely upon both the art and science of teaching.

Waratya Thamkittiphop (2005, page 24) said that learning management means recommended steps in the activities, implementation in relation to the content, and making the learning process effective for students or achieve the objectives of teaching effective.

Concluding that learning management means the interoperability process of teachers and students that is defined in the learning plan to fit the content, in an environment of learning in various fields to develop the students to achieve the goals of the curriculum.

2. The process of mathematics learning management

Learning management can rely upon different elements that are involved together and create a process where teachers have to perform for learning management more effectively. Many educators have a perspective on the process of learning management as follows:

Arphon Jaithiang (1997, pages 6-8) said that elements of learning management which will be composed of different processes, and that make learning management more complete are:

1. The understanding of the purpose of learning management is the first important element of learning management, this makes teachers know what they have to manage the teaching for.

2. Determination of content means the selection and ranking of content for learning management.

3. The learning activity is an important element as well, because teachers need to know how to manage teaching. It will be an appropriate methods to the nature of the content with learners, classroom conditions, and consistent with the purpose of learning as defined.

4. Using learning materials is an important part in helping students to learn faster and clearer as well as helping stimulate attention better to help the students to learn better.

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5. Assessment and grading helps to know if, in the past, learning management was successful or not? And how much? Student achievement is compared according to the purpose of that which is defined it, or not?

The Institute for the Promotion of Teaching Science and Technology (IPST) (2003, pages 9-11) presented the important elements in mathematics learning management. These are: The learning process courses, assessment, and grading are important to learning management as well. Integrating elements of the 3 elements together with feedback in mathematics learning management are valuable to students and will help management learning in schools succeed even more. The relationships of such components displayed in chart 1:
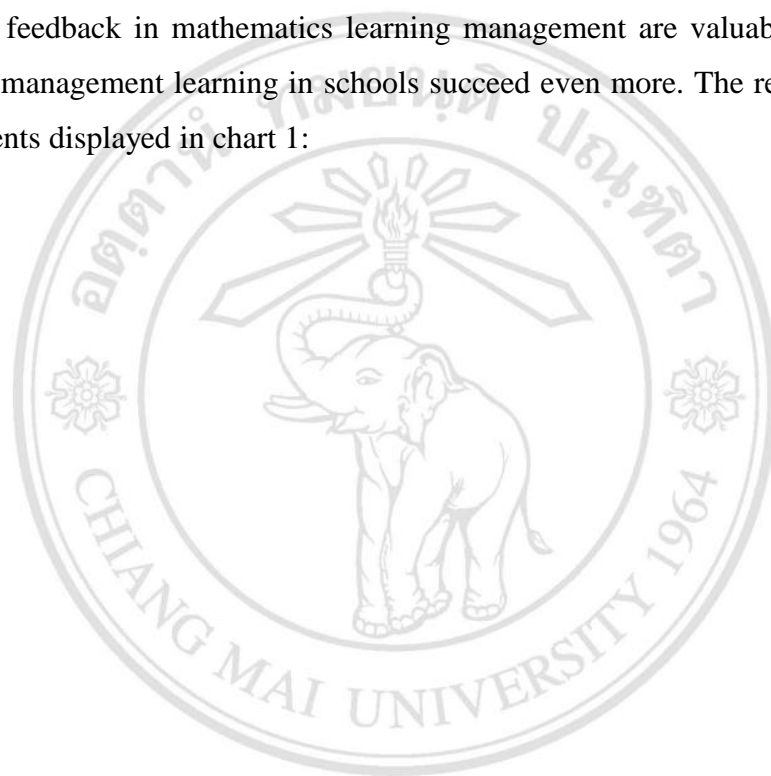
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                        Curriculum
                        - Vision
                        - The quality of the learner
                        - Substance
                        - Learning standards


        Learning process
        - The solution
        - Reasoning                              Assessment and Grading
        - Communication, Interpretation          - Conceptual knowledge
          and Presentation                       - Processes skills
        - Links mathematical knowledge           -  Desirable characteristics
        - The initiative
                    Etc.
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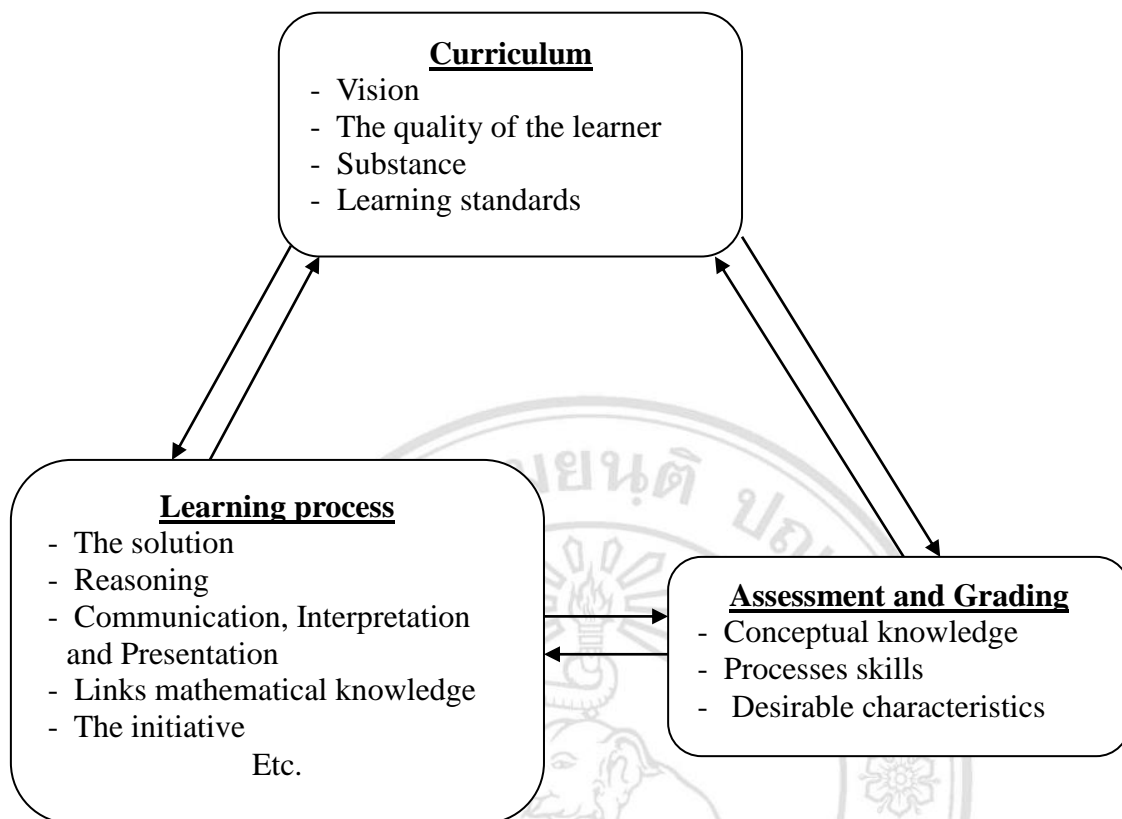
Chart 1 Integrating factor of the course, learning process and assessment and

grading in the process of mathematics learning management.

From chart 1 it was discovered that the important elements of the process of mathematics learning management are: The program, learning process, assessment, and grading. By integrating the content of the program, the learning process, and measurement and evaluation together, these are important issues to consider as follows:

1. Consideration for the consistency between the approaches of measurement and evaluation, of schools and learning, of learning standards of learning math, the local needs, the age-appropriateness, and the developmental level and experience of the students.

2. Consideration for the learning activities, use of learning materials, and a variety of measurement tools to evaluate guidelines, appropriate for the ability of the students.

3. Consideration of the participation of the students who are related to the educational management of schools in preparing the assessment framework, quality

criteria, and performance of the measurement. And the regular evaluation consistent with the standards that are defined.

Office of the Basic Education Commission (2011 c, page 11-73) proposed a learning management process. It can be summarized as follows:

1. The pre-process of preparing the learning has to be performed as follows:

1.1 Analyze the program to demonstrate the consistency of the standards of learning, indicators, and the learning of the core curriculum of Basic Education Act 2008.

1.2 Preparation of the unit.

1.3 Preparation of concept mapping unit.

1.4 Learning management design.

1.5 Preparation of the lesson plans.

2. The learning management process as the implementation of the lesson plans.

3. The measurement and evaluation of the learning management by checking that the learners have progressed in learning, knowledge, skills, capacity, and attitude according to indications that are defined more or less, so that they have to hold to the principles of measurement and grading as follows:

3.1 Focus on the grading and evaluation process to develop learners (Formative Evaluation) and to determine the grade (Summative Evaluation) covered in the cognitive domain, the psychomotor domain, and the affective domain by paying attention to both knowledge, moral principles, and the learning process.

3.2 Focusing on the assessment, to use this information to plan for improvements, and to manage the learning of the teacher and the learning process of the students.

3.3 Focusing on the assessment, in the various methods in accordance with the many learning processes, authentic assessment, reflection capabilities assessment, and the expression of learners.

3.4 Focusing on integration, including the evaluation, in conjunction with the teaching and learning process of the students, by evaluating the quality of work and the learning process of the students.

3.5 Focusing on the students involved in the assessment criteria; encourage self-assessment, assessment by peers or peer groups, and by teacher, parents and people who are involved in the assessment.

3.6 Focusing on the assessment the learners, covering from the development of the learners, their conduct, and noticing their learning behavior, joint activity, and testing.

Studying the process of learning mathematics above discovered that there are 3 elements displayed in table 2:

Table 2 Show factors of the mathematics learning management process

Concept	Learning management Planning	Learning Management	The reflection on learning management
1. Arphon Jaithiang	1. Setting the purpose of teaching. 2. Determination of content.	1. Planning the teaching activity. 2. Using teaching materials.	Grading and assessment
2. The Institute for the Promotion of Teaching Science and Technology (IPST)	Determine the curriculum in the vision, quality of learners, and learning standards substance.	Learning process	Grading and assessment
3. The Office of the Basic Education Commission.	1. Analyze the curriculum. 2. Prepare the unit of learning. 3. Prepare concept mapping unit of learning. 4. Design of learning management. 5. The preparation of lesson plans.	Learning management according to the lesson plans.	The grading and assessment of learning management.

3. Guideline for mathematics learning management

Mathematics learning management, according to the elements of the learning management process, is to achieve the goals defined in that curriculum. Educators and supervision agencies in charge of mathematics learning management presented the ideas and suggestions for learning management planning and learning management performance as follows:

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The Institute for the Promotion of Teaching Science and Technology (IPST) (2002, pages 1-4) proposed guidelines for mathematics teaching management. By opening the opportunity to learners to think and solve problems by themselves, being able to study and research from all media and technology independently. The teacher contributes by preparing the content and activities in accordance with the interests and aptitudes of the learners by considering about the differences between individual people. The teachers serve as a consultant to advise and guide the shortcomings of the learners. The teachers prepare the activities, including the kind of learning that occurs together as the group. This is the concept of the learning management that opens the opportunities for learners to share ideas, solve problems together, discuss the debate, and comment on reasons with each other. These activities will help learners develop the knowledge skills/ thinking processes and to gain more experience in grouping learners together to solve problems. It can be as a small group of 2 people or small groups of 4-5 people, or may be classified as an activity for learners to share solutions as a large group in the class depending on the step of the learning activity in activity-based mathematics learning management. The important thing that teachers should think about learner's basic knowledge to learn new content in a step preparing them to get ready for the activities. Teachers can use questions to link the content or stories that relate and lead to content of the new content or use various tactics to review existing knowledge. In the step to practice the activities, teachers may use the issue that is linked with the story in preparation to get ready and use various tactics, so that the learners can conclude or understand the principles, concepts, rules, formulas, postulate, theorem or self-definition. While the learners practice the activity lessons, teachers should provide independent thought to learners but teachers should circulate to various groups to watch for a comprehensive review and give recommendations as necessary. When giving learners the opportunity to present the concept of each learners or the concept of a group, it is important that teachers should have frequently practical because in the presentation students have the opportunity to show additional concepts together or questions for discussion or disagreement with the cause and effect. Teachers have the opportunity to expand knowledge or summarize the important points that might include the abstract notion of the material presented therein. By making learning expand more broad and deeper so that students can take their knowledge or idea from

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the presentation to apply or to be used in an example in practice. Another good result about the student learning was they presented their work so the learners had a good attitude, proud of their contribution, having a good feeling to think, to do, being assertive, and having memorable anecdotes that they presented for a long time. For the step of training or practice, students should be trained individually or practice by groups depending on the material and activities. Due to the nature of mathematic learning they have to rely upon basic knowledge contiguous. Mathematic learning management for kids, and teachers should give learners the opportunity to learn from practice/doing the activities and practice/procedures by observing practice. Thus being trained to give reasons and draw conclusions from physical media or various models first and then expand their knowledge into the abstract wider and higher levels according to the ability of the learner. That is, if the material content or activities that teachers make it too difficult or require basic knowledge that is higher than learners have. Teachers should form the basic new knowledge that may be used to reduce the problem; it is easier or prepares the supplementary learning activities for them.

Yupin Pipitkul (2002, pages 11-12) proposed the following ideas about mathematics learning management:

1. It should start from easy and move to the more difficult. The example may be raised by a small amount first.

2. The transition from the concrete to the abstract, in that regard, can use the learning media combinability.

3. Teach to relate ideas when teachers are reviewing anything should review within all of the subjects. Gathering together the same category will help learners to understand and remember more accurately.

4. Change teaching methods, avoid being repetitive, boring, teach fun, include poems, games, music, narratives, illustrations, cartoons, puzzles and interpolations of odds and ends to make lessons interesting.

5. Use learners' interests to start the inspiration to learn, and then import this interest into lessons.

6. Thinking about the previous experience and existing skills, new activities should be included with the previous activities.

7. Subjects that are related should be taught simultaneously, such as: equal sets with equivalent sets.

8. Teach students to see the structure not only the content.

9. Do not be too tough. For smart learners, separate them and use them to tutor individuals to encourage potential.

10. Teach students to find their own conclusions, give many examples until learners see patterns which will help students able to make conclusions. Do not hurry to tell them but choose a different teaching methods according to the content.

11. Allow learners to do practical things, in real practice and authentic assessment.

12. Teachers should have a sense of humor in a classroom atmosphere to help students want to study more. Mathematics is a hard subject; teachers should provide students with fun, not stress.

13. Teachers should always be enthusiasm and alert.

14. Teachers should seek more knowledge to bring something new to convey to the students, and teachers should have faith in their careers; it will make their teaching better.

Ministry of Education (2008, pages 58-90) defined the guidelines of mathematics learning management in the core curriculum of the Basic Education Act 2008 as follows:

1. Learning management that engages the learner is essential to giving the opportunity to students to think and solve problems on their own, and for them to be able to research from media and technology freely. The teachers also helps in preparing materials and activities in accordance with the aptitudes and interests of learners, by thinking about the differences between individual people.

2. Prepare the accompanying activities for the event of learning as a group, thinking together, solving problems together, discussing, and commenting on their reasons together.

3. Learning management has to think about the basic knowledge of the students for learning the new content. Teachers need to prepare the students to get ready with various tactics.

4. Teachers need to gives learners the opportunity to present the idea of individual learners, or groups. This should be conducted frequently because it will give the opportunity for learners to supplement concepts together, and for teachers to have

the opportunity to enhance their knowledge, expand or conclude the important things in the concepts to help learners learn wider and deeper.

    5. Teachers should be given the opportunity to students to learn from real practice, able to practice the skills or processes by observing practice, giving the reasons and conclusions of concrete media, or by the simulation of things before spreading knowledge to the abstract.

    4. Grading and assessment of mathematics learning. Grading and assessment are the key elements of the learning management process. It reflects the learning management of teachers and the learning results of learners. The Institute for the Promotion of Teaching Science and Technology (IPST) (2003, pages 11-27) recommends the grading and assessment of mathematics as follows:

    4.1 Principles of grading and assessment of mathematics learning

    Grading and assessment of mathematics learning has the major principles as follows:

    4.1.1 Grading and assessment must be done continuously along with preparing learning activities.

    4.1.2 Grading and assessment must be consistent with the quality of the learners, identified as learning standards, and must comply with the expected learning outcomes as set out in the school curriculum adopted in the guidelines for learning.

    4.1.3 Grading and assessment must cover all aspects of knowledge, ideas, thinking included with the mathematical process skills and desirable features on the subject held in the school curriculum.

    4.1.4 Grading and assessment of learning mathematics needs to help get information about the learners. This can be done by using appropriate tools and methods.

    4.1.5 Grading and assessment is a process that will support the learners towards enthusiasm to improve mathematic proficiency. The aim is to evaluate the results to be used in the planning of the learning management and improve the learning process of the learners.

    4.2 The process of grading and assessment of learning mathematics.

    Grading and assessment of learning mathematics has processes and many methods for different purposes and needs of the assessors so that the grading and assessment in each step must be related in chart 2:
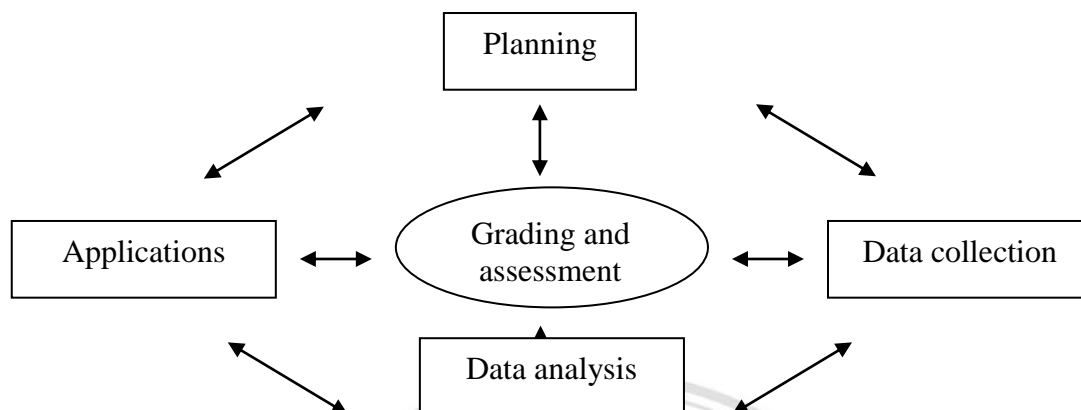
Chart 2 The relationship of grading and assessment activities.

From Chart 2 the relationship of each has details to consider as follows:

1. In grading and assessment planning by teachers, the learner and those who are involved with it have to jointly define key details that contain:

1.1 The purpose in applying the data information that comes from the grading and assessment.

1.2 The framework of the learning and the process skills that are needed in grading and assessment.

1.3 Collecting and analyzing data.

1.4 Judging criteria of performance of the learners.

1.5 The model that was used in the summary, judgment and reporting.

2. The data collected in the learning management must consider the assessments together with using the appropriate grading and assessment tools to collect information in accordance with the plan.

3. With data analysis the teacher will take the information that is gathered and analyze it to lead to conclusions about the learning outcomes of learners as individuals, or groups, based on the job and standards-based learning, together with the data collected as evidence.

4. The adoption, teachers and others who are involved with this can take the results of the analysis to use it for a purposes specified.

3.3 Grading and assessment guidelines.

Grading and assessment of mathematics is a quality review process of the learners, using a variety of methods based on actual conditions. Focusing on the knowledge and ideas, mathematic skills are desirable to get sufficient data and to meet reality to sum up the work that the students follow, using real conditions as defined in the curriculum and the learning development of the students that are consistent with the quality of each student according to the courses that define the goals as follows:

4.3.1 To help the learners learn on their own, using their full capabilities.

4.3.2 To help the evaluation in accordance with the circumstances or events that occur in real life.

4.3.3 To help the teacher to search the strengths of the learners and to support the development to their full potential.

4.3.4 To recognize the shortcomings of the learners and improve them over time.

The authentic assessment will help to develop and support the performance of the learners that covers knowledge and ideas, process skills, and desirable features as relationships shown in chart 3:
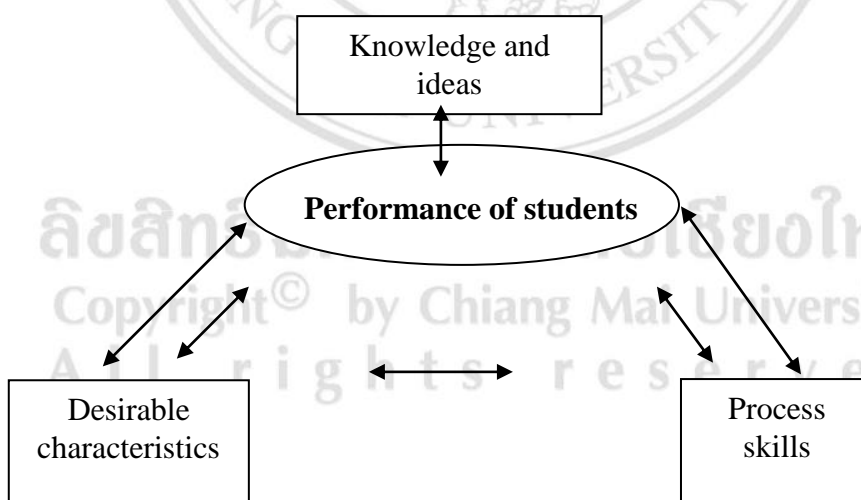
Chart 3 Authentic assessments that affect the performance of learners.

From chart 4 the evaluation of the performance in each field above can be considered from the behaviors that are expressed by the learners in various fields as follows:

1. Knowledge and ideas

Knowledge and ideas in mathematics is the development of the competencies of the learners that is expressive with in behaviors displayed in table 3:

Table 3 Show about the development of competencies of the learners according to expression

Capacity	Expression behavior
1. Recognition	- Telling the definitions, theorems, and agreements.
2. Understanding	- Description and gives an example.
3. Applications	- Apply the knowledge to use in the actual situation.
4. Analysis	- Separate complex concepts into parts.
5. Synthesis	- Collect the knowledge, fact, and conclusions or creating new knowledge.
6. Evaluation	- Compare knowledge and decision or conclusion to the selection criteria specified.

From table 3 the grading and assessment of the knowledge and ideas has to consider the purpose of the evaluation that is determined by considering the expression of behaviors according to what is identified in the curriculum.

2. Process Skills

Process skills are necessary for mathematics learning and should include; the ability to solve problems, giving reasons, communication, mathematical interpretation and presentation, linking knowledge of mathematics and linking mathematics to other sciences creativity.

Mathematic skills can evaluation the ability to express according to the steps of each skill displayed in table 4.

Table 4 Shows the methods to evaluate the learning behaviors for each skill

Process Skills	Expression according to steps of skills.
1. Solving problems	- Understand the problem by identifying issues, variables, and relationships between variables.
	- Create possible mathematical models.
	- Check the suitability of the model.
	- Ensure the correct and possibility of a solution.
	- Check the step of solutions.
	- Gather relevant knowledge.
	- Use knowledge to grade the process of reasoning and conclusions.
	- Ensure the correct and reasonableness of justification.
2. Giving the reason	- Select the model of communication, interpretation and presentation with the appropriate methods.
	- Use text, vocabulary, formulae, equations, or a universal chart.
	- Record all works in all steps reasonably.
3. Communication, interpretation, and presentation	- Summarize the essence that is taken from the research of knowledge from learning resources.
	- Give the opinion on the issues properly.
4. Linking the knowledge.	- Compare the knowledge of each science.
	- Link to the actual situation with mathematical models.
	- Research conclusions from the mathematical model.
	- Link knowledge in each mathematical knowledge to other sciences to contribute to the learning of complex concepts.
	- Summarize the essence that is related with mathematics and other sciences.
5. Initiative	- Use knowledge or concepts to create new knowledge.
	- Create mathematical model or the work pieces that benefit the learning of mathematics.

3. Desired characteristics

The desired characteristics learners get from the activity stream of mathematics learning such as: work is systematic, it is disciplined, learning is carefully done, with responsibility, being self-critical, gaining self-confidence, and recognizes the value and promoting a good attitude toward mathematics.

Grading and assessment learning must act to cover the capacity that is desirable on 3 sides by the nature of possible assessment as follows:

1. Assessment by an instructor is learning assessment. The instructor is the creator of the tool and is to be a person who measures the learning assessment of students.

2. The assessment by teachers and students is a learning assessment by the teachers and students jointly to define the goals, scope, and various criteria of assessment including assessment together.

3. The assessment by learners is learning assessment by students as the person to define the goals, scope, and create work including self-evaluation.

For all 3 assessments above, there might be other stakeholders such as: school administrators, instructors in other subjects who have substantive relationships, including parents who can evaluate the students appropriately.

Grading and assessment of the capacity of all three above assessments are accomplished using a variety of tools consisting of the assignment workload, portfolio mathematics and mathematics projects. Testing of competency in knowledge, ideas and mathematical process skills may use as tests in conjunction.

4.4 The instrument used for grading, and the assessment of mathematics

The instrument used for grading and the assessment of mathematics consistent of the grading and assessment methods of the 3 aspects mentioned above and can be classified in2 categories as follows:

4.4.1 Test.

4.4.2 Assignment workload.

4.5 Evaluation criteria for learning mathematics

Grading and assessment of mathematical learning effectively has to comply with learning management criteria defined precisely and comprehensive learning outcomes that are expected. The criteria used in the evaluation of mathematics learning can be classified as follows:

4.5.1 Combination of the criteria used to evaluate the performance or the success of each project as an overview in accordance with the essence identified in the learning standard.

4.5.2 Analytical forms are the criteria used to evaluate the performance or portfolio that separates the assessment to the elements. The assessment results will have details that are applicable to diagnose learners and provide feedback about the achievement of the learning outcomes that are expected of the learners.

5. Mathematics teachers' standards

Institute for the Promotion of Teaching Science and Technology (2002, pages 10-55) defines mathematics teachers' standards in 10 standards as follows:

Standard 1: Nature of mathematics, the mathematics teachers must to have a deep understanding of mathematic concepts. A thoroughly comprehensive understanding of the curriculum and use the skills and a mathematical process to solve problems. It includes the learning process that makes learning essence meaningful for the learner.

Standard 2: A desire for learning and professional development of their own, and applying the mathematical knowledge to their own benefits. Mathematics teachers have to be interested in, and have the desire to learn and continue their professional development on their own and to apply the mathematics knowledge, to manage the learning and performance that is beneficial for the learners and society with regard to ethics and morality.

Standard 3: Teachers should manage the opportunities for learning for their learners, according to the learning needs and the development of the learners. Teachers need to understand the level of developmental learning of the learners, and management opportunities of learning for the learners, so they may develop intellectually, socially, physically and personality.

Standard 4: The teachers management of the learning process based on the difference of the learners. Teachers should understand the differences of their learners, and use this information as fundamental to the management learning process to develop the learners' full potential.

Standard 5: Apply the methods of learning management in the proper way to develop idea process and learning of the learners. Mathematics teachers have to

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understand the learning principles, and use the methods of learning management in various ways to support the learners to develop critical thinking processes and solutions.

Standard 6: Teachers should create motivation in their students, and so inspire them to learn. Mathematics teachers have to understand about the motivations and behaviors of learners or groups of learners. They can then create a situation or conditions that motivate the learners to be interested and be inspired to learn.

Standard 7: Using communication skills to promote learning. Mathematics teachers need to have communication skills, and use the language correctly. Both in speaking and writing, to encourage students to use their skills and mathematical processes to inquire and look for solutions, including good interactions in collaboration.

Standard 8: Curriculum development and learning management planning. mathematics teachers must have the ability to develop the curriculum in schools and prepare lesson plans of learning management to develop learners' learning in accordance with the goals that are defined by thinking of the desirable characteristics of the learners and consist of the needs of the community.

Standard 9: Teachers must use assessment to develop learning. mathematics teachers must have the ability to use evaluative methods based on the authentic comprehension of the performance of their learners. Using this knowledge, thinking skills, processes, attitudes and applying the assessment results to develop the learning of learners continuously.

Standard 10: Leading the community jointly together to manage the education and develop the learning of the learners. Mathematics teachers need to support the relationship between the schools and the community and provide opportunities for parents, communities and organizations to be involved in supporting management education to develop the learning of the learners.

Using the mathematics teachers' standards above, the researchers used an initial concept to define the goals for the result of supervision, or effectiveness of supervision as an capacity for the learning management of mathematics teachers containing the standards as follows:

Standard 4 Managing the learning process based on the differences of the learners.

Standard 5 Applying the methods of learning management properly to develop an idea process of learning for the students.

Standard 8 The development of curriculum and planning for the learning management.

Standard 9 The assessment plan to develop learning.

Research of the course of mathematics learning groups according to the Core Curriculum for Basic Education Act 2008. The concept about mathematics learning management and mathematics teacher standard that are mentioned above, the researchers used this as a guide in determining the concept about the capacity of the learning management of mathematics teachers as follows:

1. Learning management planning, teachers must be prepared on the topic as follows:

1.1 Study the course, teachers guide and documents of learning management. Then make them all analyze the course documents.

1.2 Research learners to understand their basic knowledge, previous experience, capacity, and interest as information for preparation of learning management.

1.3 Learning management planning with all topics as follows:

1.3.1 Learning standards.

1.3.2 Grade – level Indicator.

1.3.3 The learning objectives.

1.3.4 The strand.

1.3.5 The process of learning management.

1.3.6 Media / learning resources.

1.3.7 Evaluation and assessment.

1.3.8 Checking the lesson plan by the executives.

1.3.9 Recording learning management results.

1.3.10 Appendix

1.4 Preparation the materials/learning resources, documentation or tests, as well as facilities to be ready before learning management implementation.

2. Learning management, teachers implement the learning management model in accordance with, and taking into account the following:

2.1 According to the sequence of steps already planned in the lesson plans.

2.2 Use learning management skills properly, such as: explanation, using speech, manner, and posture.

2.3 Use the learning management methods in many ways that encourages the learning of students. That makes the students have the best learning.

2.4 Emphasizes the students to participate in the activity and practice on their own.

2.5 Use the media/learning resources appropriately consistent with the lessons and promoting learning.

2.6 Using the psychology of learning correctly such as: strengthening support, skills training, give the task according to ability and individual aptitude.

2.7 Creating an environment to promote learning both materially and spiritually such as: clean classrooms, brightness, extensive, and the teachers benevolent compassion.

3. The measurement and evaluation of learning management, performance as follows:

3.1 Measurement and evaluation consistent with the purpose of learning.

3.2 Using the methods and evaluation tools to measure and evaluate that matches with the actual conditions.

3.3 Improvement in the process by finding the causes of short comings, and the use of remedial teaching.

2.5 Factor analysis

Factor analysis is a statistical analysis technique that helps researchers to create factors from several variables. By grouping the variables that are associated together, to be the same factors to reduce the number of variables. However, some variables may have the same features or be similar, and may be cut it off or set it in a new set of variables that are called Factors. From research papers studying that related to factor analysis, the researcher presented on issues related to the benefits of factor analysis, the objectives of the factor analysis, preliminary agreement, Feature Data, factor analysis process, and then presented details sequentially.

Benefit of factor analysis

Kallaya Wanichbancha (2001, pages 250-252), Supamas Angsuchot and others (2008, pages 94-97) said that the factor analysis has benefit as follow:

1. Reduce the number of variables, by grouping variables into the same variable to be a new variable that can be a Factor Score, and can be analyzed statistically to another such as: Analysis of variance (ANOVA), Regression Analysis, Hypothesis testing, and discriminant analysis, etc.

2. The grouping variable, can explain the meaning of each factor.

3. Use of a solution of the independent variables is interrelated (Multicollinearity), in the regression analysis.

4. Reveals the correlation structure of the variables to study. Variables are related more or less in the factors from loading factors because the Factor Analysis Techniques will find the correlation coefficient (Correlation) of each pair of variables and then grouping variable affinity in the same factors.

5. Using factor analysis as a tool to monitor the constructed validity of the variable that have constructed the definition of a theory, or not, and how it relates in accordance with the actual situation.

The objective of factors analysis

Kallaya Wanichbancha (2001, pages 249-250), Suphamas Angsuchot and others (2008, pages 93-94) said that the factors analysis has objective as follow.

1. To explore and identify common factors, for grouping variable, by reducing the number of variables that correlated very well in with the same factors, which makes the information easy to understand. The data is easy to interpret including and understanding the pattern and structure of data relationships. After that, it will be named a new factor consistent with the variables in the group. This method is called Exploration Factor Analysis Model. New factor are to be the Linear Combination of the original variable by taking the details of the original variables and then gathered into new factors as possible.

2. To confirm that the accuracy of the variable weight of the empirical data is consistent with the hypothesis only. This method is called Confirmatory Factor Analysis Model. Defining the variable weight. If the researcher defines the weight by themselves they will be incorrect and then need to examine or verify the accuracy of that value. By analyzing the factors of Confirmatory Factor Analysis Model which is to test the theory that the factors matching with a model is matching with the theory or not?

3. Searching the variables weights that are in the same group or the same factors.

Condition and primary agreement

Kallaya Wanichbancha (2001, page 3), Suphamas Andsuchot and others (2008, pages 97-98) said that in a factors analysis of variables that bring into analyzed must have the following features.

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1. Variables of the set in the group should be quantitative variables and in the case that the group variables are mixed in together will have to change the group variables in the form of Dummy Variable first such as: variable status (X1) must be defined.

$$X_1 = \begin{cases} 1 & \text{1 If the respondent is unmarried} \\ 2 & \text{If the respondent is married} \end{cases}$$

2. The relationship between the factor and variables in linear form only.

3. For the Principal Component Analysis Technique, each variable does not require a normal distribution but if some variables are quite skewed, and the distribution is outside the norm, the results may not be correct.

4. In general, different variables have different units such as: age is measured in years, income is measured in baht, experience is measured in months, etc. In this case, the income may be most important. (Most Factor Loading). So before analysis by Factor Analysis all variables should be adjusted. The mean as zero and the variance is 1, which makes it to be standardized information first.

5. The number of case should be at least 10 times more than the number of variables.

6. The variables that are taken for analysis, should have the factors in relationship of at least .30.

Factors analysis process

Kallaya Wanichbancha (2001, pages 253-257), Suphamas Angsuchot and others (2008, pages 102-103) presented the 4 factors analysis process as follow.

1. Search for the Correlation Matrix.

2. Factor Extraction or Initial Factor

3. Factor Rotation.

4. Factor Score.

The details of each stages are as follows:

First Stage: Searching the Correlation Matrix

Determining the correlation coefficient (r) by the Pearson Correlation method.

1.1 If the correlation coefficient (r) of any pair variable closer to +1 or -1, it shows that pair variable has a high affinity and should be classified in the same factors.

1.2 If the correlation coefficient (r) of any pair variable closer to 0, it shows that pair variables are related very little or very low and should be classified in different factors.

1.3 If any correlation coefficient (r) has no relationship to any other variable, or has only a little correlation, it should be cut off.

In Correlation Table, all variables are to be grouped in tables relationship and shows the relationship, as shown in table 5.

Table 5 Shows Correlation Matrix

Correlation	Sex	Ex1	Ex2	Ex3	A1	A2	A3	A4
Sex	1.000	-.235	.458*	.677*	.345*	.502*	.425*	.814*
Ex1	-.235	1.000	-.165	.142	-.233	.165	.002	-.400
Ex2	.458*	-.16	1.000	.736*	-.263	.653*	.593*	.516*
Ex3	.677*	.142	.736*	1.000	-.506	.683*	.756*	.505*
A1	.345*	-.233	-.263	-.506	1.000	-.023	-.226	-.225
A 2	.502*	.165	.653*	.683*	-.23	1.000	.872*	.261
A 3	.425*	.002	.593*	.756*	-.226	.872*	1.000	-.122
A 4	.814*	-.400	.516*	.505*	-.225	.261	-.122	1.000

From table 5, when considering the correlation coefficient it is noticed that each pair of variables is interrelated.

In addition to the tables of Correlation Matrix, the analysis relationship may use the technique of KMO (Kaiser - Meyer - Olkin) to check it that how much the data collected will be used to analyze the factors. Which Hair and others (1998, P. 99) cited in Suphamas Angsuchot (2008, page 97) presented as follow:

KMO $\geq$ 0.80 shows that this data has the most appropriate data to analysis with Factor Analysis method.

KMO 0.70 – 0.79 shows that this data has very appropriate data to analysis with Factor Analysis method.

KMO 0.60 – 0.69 shows that this data has medium appropriate data to analysis with Factor Analysis method.

KMO 0.50 – 0.59 shows that this data has little appropriate data to analysis with Factor Analysis method.

KM < 0.50   shows that this data has inappropriate data to analysis with Factor Analysis method.

Second Stage: Factor Extraction or Initial Factor

Factor Extraction or Initial Factor, will bring out the relationship in the first step to extract factor extraction to get the first factor which has many methods such as: Principal Components, (PC), Image Factoring, Alpha Factoring, Unweighted Least Squares, (ULS), Generalized Least Squares, (GLS), Maximum Likelihood, (ML), and etc. In general research, the most commonly used is the Principal Components, (PC). Therefore, in this study this method is use as follows:

Principal Components Penkhae Siriwan (2003, pages 1 5 -1 8) said that this factors analysis is to analyze the factors in each factors. Each factors will have a Linear Combination with the original variable to get the new factors by using the first factor will explain the mutability of the original variable. The relationship of the factors with original variable will be reduced accordingly. This analysis will be analyzed until the factors can explain the mutability of all the original variables.

Example: Analysis the factors X_1 - X_{10} factor extraction will have Component Matrix. In the table, it shows that when factor extraction, then the whole original variable is going to be a new member of the new factors and the figures in the table represents Factor Loading, as shown in table 6.

Table 6: Shows the resulting of Factor matrix and Factor Loading.

Variable	Factor Matrix	
	1	**2**
X_1	.372	-.632
X_2	.400	-.500
X_3	-.511	-.460
X_4	.720	.580
X_5	.711	.555

Extraction Method: Principal Component Analysis a.2 Component Extract

Stage 3: Factor rotation

The factor rotation will make any variable more obvious in the grouping factors. Sometimes the factor loading will have a medium value that is not clear, making the grouping variable difficult. The Factor Rotation makes the factor loading having the changes value until it is known which variable should be in the factors.

There are 2 Factors Rotation.

1. Orthogonal rotation.

2. Oblique rotation.

The details are as follows:

1. Orthogonal rotation

Orthogonal rotation is the rotation factor in the factor or component perpendicular to each other. The result of rotation will make the factor loading increased or decreased. The orthogonal rotation has 3 small methods.

1.1 The Varimax method is a way to make factor loading of the original variable at a high value. In the minimum number of variables, this method considers particularly the factors that have a high factor loading only, or this method is reduces the number of variables with a high factor loading only. This method is convenient and easy because it considers the factor loading of the original variable of the high value only, it is more popular than others method.

1.2 The Quartmax method is a way to define the factors for variability by the minimum number of components.

1.3 The Equamax method is a way to mix all from the two methods, making it easier to interpret the variables that should be in each factor.

2. Oblique rotation

Oblique rotation is similar with Orthogonal Rotation each, defining the corner in rotation can be made in two methods.

2.1 Direct oblimin method, can set the rotation angle of delta by get a value between 0-.8.

2.2 Promax method by define the Kappa in which the real number is more than 1, to set the exponents in action forms an angle of rotation.

The selection of rotation method depends on the opinion of the researcher; if the researchers think that the new factor has to have a relationship, they will chose the Oblique Rotation. But, if they think that new factors should not have the relationship they will chose the Orthogonal Rotation. However, the researcher should using both methods, then choose the smallest factors, but describe the most variability and naming factors. They have to name the factors to convey all variables in the factors.

Stage 4: Factor score

A set of variable to factors constitutes a new factor already, using a software package to calculate the variables and named that facl_1 fac2_1 fac3_1 for finding the first factor score of the 1st -3rd factors have a meaningful is.

Fac1_1 the meaning is No. 1. "Fac" means factor.1_1 means the first analysis.

Creation method and factor scoring

The software package has created a method or factor score in 3 methods such as: Regression, Barleft, and Ander-Rubin (A-R).Regression method is the most popular.

The Regression methods is the way to create the factor score from the sum of the coefficients and factor score multiplied by the value of each variable (X1) in standard scores. This is the example, as shown in table 7.

Table 7: Shows example factor score

Variable	Factor 1	Factor 2	Factor 3	Factor 4
X_1	.40	.60	.42	.24
X_2	.63	.52	.11	1.42
X_3	.73	.46	.45	.67

Estimation variable can do it as follows:

$X_1 = (.40 \times .41) + (.63 \times 1.42) + (.73 \times .67) = 1.48$

$X_2 = (.60 \times .24) + (.52 \times 1.42) + (.46 \times .67) = 1.19$

$X_3 = (.42 \times .24) + (.11 \times 1.42) + (.45 \times .67) = 0.56$

The estimate of the variables will be very close to the actual value of the variable because they used all the elements. If they use some of the factors, the values may differ from reality. Sometimes the factors were cut out which affected the variable explanation very little. The estimates may not differ much from the truth and so there is no need to use every factor.

2.6 Needs assessment

1. The definition of needs assessment.

The educator provides a definition of needs assessments as follows:

Suwimol Wongwanitch (2007, p.62) said that needs assessment is an evaluation process to determine the different conditions that occur within a condition that should identify the needs, what is wanted to happen, with what it currently looks like, and assess what actually happened with what it looks like. After that, taking the results of the analysis of what actually happened, something that deserves to be changed in a creative and positive ways.

Chaiyot Phaiwittayasiritham (2008, page 8), said that needs assessment is the methods to get information that reflects issues that need to fixed in a target group, by considering the difference between what is to be, and what should be. These differences will bring the information defined as an alternative solution, or planning to work properly.

Virat Aiemsridee (2011, p.54) said that needs assessment means the process of determining the difference between the expected state and the actual state that can observed. Then bringing the results of the difference to sort out priorities, using this information in the decision to solve the problem further.

In conclusion, needs assessment means a process that reflects the difference between things or events that occur in the present with what is expected to happen, and to bring the results of the evaluation to be use to determine the guideline or the methods needed to solve problems or develop the work further.

2. The process of needs assessment.

Suwimol Wongwanitch (2007, pages 105-132) has proposed a process of needs assessment as follows:

1. Specify what is anticipated. (what should be)

2. Measure the current physical condition. (what is)

3. Find the difference between the information from point 1 and point 2.

4. Find the cause or reason that makes the difference.

5. Sort the priority of the issue.

3. Techniques used for needs assessment.

Suwimol Wongwanitch (2007, pages 141-161) has offered technical methods that were used to collect the needs data. They can be summarized in 8 technical important methods as follows:

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1. Survey

2. Priority setting

3. Group process

4. Analysis of the causes of the needs such as using the fishbone diagram (Fish boning)

5. Multi-attribute utility technique

6. The technique to study the impact of option is technically about analyzing the future such as : Task analysis, risk assessment, trend analysis, and cross - impact analysis.

7. Concept mapping technique

8. Photo-voice technique

Of all of these 8 techniques the researchers present the details of the second technique as the Priority setting due to the relationship of this research, which Witkin (1994. P. 5) said, that the prioritization of needs is commonly used for the prioritization of needs has been gotten from the survey and separated according to the characterization of data. Used by 2 groups such as: Single–Respond, and Multiple Data Sets. And Suwimol Wongwanitch (2007, pages 265-279) offers details as follows:

1. The prioritization data of Single–Response is to sort priorities of needs from a set of needs, or any of the many details that answers the questions of the assessor with each question being answered with only one answer. After that, the needs will be sorted by priority from the most important to least important, or from least important to most important. The methods of sorting this type of information is well known and widely used by assessors because it is easy to understand the methods, and it is quick and easy to manage.

2. The prioritization of data of the Multiple Data Sets that needs assessments can use different models, but must have multiple data sets to correct the data in 2 subjects. In each assessment topic the subject relating to the environment, or the actual status and the subject related to the condition or status that is expected and that should be or is desired. The prioritization data of Multiple Data Sets has a method as follows:

2.1 Rank - Order - If Different scores, identify the expected state, and the state of current reality, and bring the averages for the answer. Then determine the difference between the average of conditions expected, and the state of current reality and sort the priority. This method is very popular but is less accurate.

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2.2 Three - Factors Index -Respondents answer importance, attainment, and responsibility. Then bring the organized data to identify the most important needs. These methods will be difficult to gather data because the respondents have to answer three questions on each subject.

2.3 Matrix Analysis will give the picture that the results of operations of each agency will be in. What the level is by dividing the table into 4or more parts, to illustrate the relationship between the states of anticipation and the actual state. The breaking point may be the average or evaluation criteria that the assessor properly sees.

2.4 Proportionate Reduction in Error: PRE -These methods will arrange the needs of prioritization by using the statistics, telling the priority in terms of probability of the 2 sets of data. This distribution occurs together and tests the accuracy of the prediction data sets from one another. This method is used in the prioritization of needs for training.

2.5 Sort priority in the form of index (Index) -This method has been developed continuously from the methods of arranging the priority of needs as proposed in 4 methods above. These methods have the statistical value or estimates that bring and sort priorities of needs by the statistics or the estimation of those that do not have attribute of the index number. The assessor has developed the methods to be better by giving the statistics in the index form and telling the value with the minimum and maximum as well. Divided into 3 groups such as: the group of using the principle to evaluate the difference, the group of Multi component Data Analysis, and the group of Weighted Needs Index. The details are as follows:

2.5.1 The groups of using the principle to evaluate the difference.

The methods in this group used the foundation from the needs assessment that were used in different models, which gathered the prioritization data of Multiple Data Sets from a gauge that showed the level of importance (I = Importance) of that message as the level of "What Should Be", and the gauge that shows the level of an item that had been responsive or at the successful level (D = Degree of Success). It is the progress at that time that is like the value that tells the level of "What Is". The formula to calculate the needs of each of the methods is as follows:

1) The methods of Mean Difference Method (MDM) determined by finding the difference between the average of I (Importance) and the average of D (Degree of Success) as follows:

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$$\text{MDM} \quad = \quad \text{I - D}$$

2) The methods of Priority Needs Index (PNI) is the method that weights the average of the difference between I and D with weighing the importance of I as follows:

$$\text{PNI} \quad = \quad (\text{I - D}) \times \text{I}$$

When I represents the state of expectation.

D represents the actual conditions.

3) The methods of Priority Needs Index (PNI)(enhanced) is improved by finding the difference in value (I - D) and dividing it by the value of D to control the size of the need, to remain in a range that is not too wide and has a metaphorical meaning. When used in the level of the status quo as a base to calculate the rate of development into a condition that is expected of the group as follows:

$$\text{PNI1} \quad = \quad (\text{I - D}) \ / \ \text{D}$$

When I represents a state of expectation.

D represents the actual conditions.

4) Matrix Analysis is the method that focuses on the presentation of the strengths and weaknesses that should be developed by dividing the table into 4 compartments to show the relationship between the state of expectation and actual conditions. The breaking point may be the average of the high point - low point that limits or criteria that the assessor sees as the appropriate for Cut of Score.

2.5.2 Multi component Data Analysis

2.5.3 The group of Weighted Need Index (WNI) is the improvement of the method of Del-Na which is a method of complicated calculation with less hassle by having the basic agreement of the evaluation topics in the group of 25 cells. The cells with a lower priority under 3 and successfully fewer than3, holding to a topic of critical assessment that is not the important need, and does not need to bring in such cells if used to calculate the index.

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The study techniques of prioritization of needs found in the documents, that the researchers use the concept to apply the operation of empowerment – Based supervision model for learning management capacity development of Mathematics teachers, School under office of Primary Education Service Area Office, Upper Northern Region , offers details of the needs assessment that was used in this research with the prioritization of needs of Modified Priority Need Index (PNI$_{modified}$) as follows:

1. The operation of needs assessment

1.1 Prepare a list of all of the needs from the reference that has had are liable collection. Include it in the collected data from specialists, or perform the data collection on a regular basis to bring the results to make the questionnaire.

1.2 Bring all information to create a questionnaire to evaluate in 5 levels that responded to the state the actual condition (D) and the state of expectation (I).

1.3 Distribute the questionnaires to assessor (target group) to answer one set per person.

1.4 Operator calculates the index of needs of each question.

2. The needs index analysis**.**

The needs index get from the technique of PNI$_{modified}$ using weighted with the value of D by dividing to determine a standard score. Then gather the results of each person together, and the average due to the index that was calculated to be attributed to be index numbers and consistent with the actual condition. The range of the index is between - 0.8 – 4.

3. The criteria of consideration needs to operations of supervision, using the criteria of consideration according to the concepts of John W. Best & James V. Kahn (2003 p.332) are as follows:

Average	Means
Under 0.00	Without the need of supervision.
0.00 – 1.00	Need for supervisory in low level.
1.01 – 2.00	Need for supervisory in middle level.
2.01 – 3.00	Need for supervisory in high level.
3.01 – 4.00	Need for supervisory the highest level.

This research defines the operation of the research according to the needs to supervisory at a high level, the average from 2.01 up.

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1. Principle, Theories and research in educational supervision such as; The principle related to educational supervision; Theories of Adult Learning of Glickman and Others ,Wiles and Bondi; Motivation-hygiene Theory of Herzberg Present by Watchara Lawriendee; Communication Theory of Costa and Garmston (2002) Present by Watchara Lawriendee; The research of Jamnong Thawaisil (2002) and Pairaw Phummun (2009) 2. Principle, Theories and research relate to empowerment such as; The meaning of empowerment; Self – Control Theory of Kouzes & Posner; Self - Determination Theory) of Borich & Tobari; Goal Setting Theory of Hoy & Miskel; Equity Theory of J. Stacy Adams Present by Hoy & Miskel; Guidelines for empowering the work of Prawat; The concept of empowerment in the work of Kanpol; The concept of empowering the teachers work of Klecker & Loadman; The concept of the practice that is the empowering the teacher work of Terry; The concept of empowering teachers work of Blasé &Blasé; The research of Tawee Promminta (2001), Somchai Bunyasiriphesat (2002), Piyathida Worayanopakorn (2003), Prawit Erawan(2005), Jaruwan Silaparat (2005), Yuwathida Chaphanya (2011) and Schwartz (2001)	**The factors and indicators of the empowerment – based supervision** **Empowerment-Based supervision model for Learning Management Capacity Development Of Mathematic Teacher, School under Office of Primary Education Service Area in Upper Northern Region**	The quality of supervision model. - Accuracy - Propriety - Utility - Feasibility

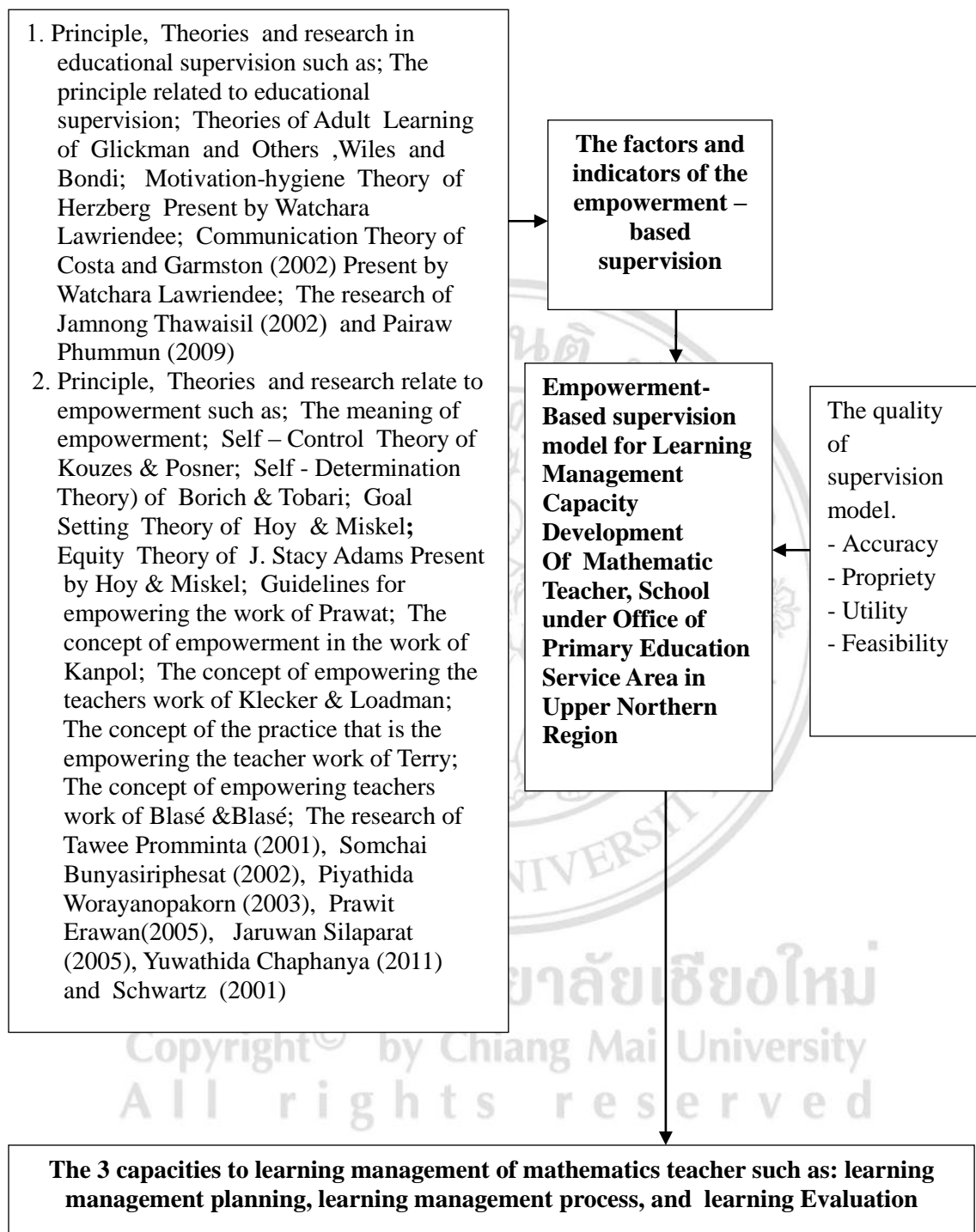**The 3 capacities to learning management of mathematics teacher such as: learning management planning, learning management process, and learning Evaluation**

Chart 4 Research concept flame work

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