

***FACILITATING THE QUESTIONING SKILLS OF STUDENT TEACHERS
THROUGH ACTION RESEARCH***



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Abstract

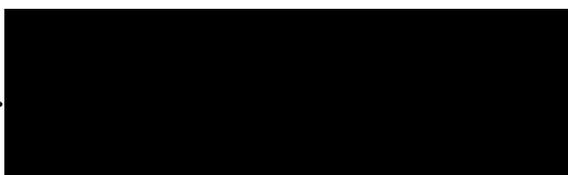
The study was designed to investigate the development of the teaching of questioning, reflective practice for development of teaching competence and systematic inquiry and reflection on the university lecturer's teaching and learning to implement change for improvement in practice. This study employed an Action Research methodology. The participants were student teachers of in the Faculty of Education, Burapha University, Thailand. There were two cycles of the data collection in semester 2, 2002 and then with the same cohort of student teachers in semester 1, 2003. Each cycle was the same but fewer student teachers were included in the second cycle to attempt to develop deeper understanding. Data were gathered from learning logs, lesson plans, journal, documents, self-evaluation, observation and group interview. Simple coding and descriptive statistics are used to illustrate and substantiate interpretations. It offers the ideas that the lecturer' teaching and learning approaches assist the development of student teachers' questioning skills. She explores student teachers' construction of knowledge and theories of practice and how these develop on questioning and thinking skills. These construction inform not only her student teachers' practice but also her own. In addition, student teachers learn how to be an effective teacher.

Authenticity Declaration

This is to certify that

- (i) this thesis is the original research of the candidate**
- (ii) due acknowledgement has been made in the text to all other material used**
- (iii) the thesis is less than 50,000 words in length, exclusive bibliography and appendices**

Signed :



.....

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Chapter 1

Introduction

The development of inquiry led curriculum in teacher education at Burapha University, Thailand is a response to strong pressure from western educational research and practice and the new Thai government policy to reform education generally. This thesis reports research which investigated the implementation of changing practices in the Burapha University teacher education classroom. The particular focus of this research is on the development of student teachers questioning skills and the planning, delivery and reflection on activities for professional development in a context of educational reform in Thailand. The project employed an action research methodology and follows a pre-service teacher education class over two semesters with the same lecturer.

Change in the Thai educational paradigm

Reforming Thai education was the result of the economic, political, cultural and social crisis in the country. The education system demanded reform so that it would be capable of competing with other education systems in the age of globalization. The rationale for the promulgation of The National Education Act (1999) was the stipulation in the Constitution of the Kingdom of Thailand. The National Education Act was imperative and demands the improvement in the provision of education

consistent with economic and social changes which were also being stimulated and implemented throughout the country. The National Education Act serves as the fundamental law for the administration and provision of education and training in accord with the provisions in the Constitution. It has, thus, become necessary to promulgate the Act (Office of the National Education Commission 2000b, p. 34).

The National Education Act was pronounced on the 19th Day of August 1999 and it took effect from August 20, 1999. This Act includes certain provisions having implications for a person's right and liberties in the field of education. It focused on a range of major issues. The National Education Act of 1999 which also enjoys the status of the Education Reform Act, aims at the full development of the Thai people in all aspects: physical and mental health; intellect; knowledge; morality; integrity; and desirable way of life so as to be able to live in harmony with other people and bring about sustainable development of the country (Srisa-an 2000, pp. 3-4).

The pronouncement of this Act results in the need for extensive strategies for implementation and should lead to the real transformation of education and the country because the people involved such as those in politics, the government and the public sectors inevitably have to follow the Act. So Thai education reform is emerging and having a real effect after decades of talks, discussions and debates about the proposed guidelines for the reform.

The reforms under this Act can be considered as a significant change of paradigm for education, and the concepts and the guidelines proposed in the Act will make

education go through the drastic transformation, some of which are outlined here.

Sinlarat (2000, pp. 1-2) suggests the reform paradigm of education in-compliance with the Act focuses on nine main aspects as follows:

Goal of the Act	Practice before the 1999 Education Act	New direction set by the 1999 Education Act
<i>1. Purpose</i>	<i>From enabling the learner to work for the government</i>	<i>To being the complete human being</i>
<i>2. Education Institute</i>	<i>From school only</i>	<i>To home/community/ Workplace</i>
<i>3. Teaching Content</i>	<i>From urban/foreign</i>	<i>To local content</i>
<i>4. Teaching Process</i>	<i>From teacher-centered process</i>	<i>To student-centred process</i>
<i>5. Professional Standard</i>	<i>From the administrator's supervision</i>	<i>To the professional and society's supervision</i>
<i>6. Administration</i>	<i>From the administration by an individual</i>	<i>To the administration by a committee</i>
<i>7. Management</i>	<i>From the supervision of the government sector</i>	<i>To the supervision of the community</i>
<i>8. Governance</i>	<i>From the central governance</i>	<i>To the local and school governance</i>
<i>9. Quality Control</i>	<i>From the internal supervision</i>	<i>To the external control</i>

The details of other features such as the content, the process, the professional standards, the administration and the management of education are clearly stipulated in the law. Srisa-an (2000, p. 14) asserts:

'The success of the Education Reform of the whole system, to emphasize, depends on the reform of in-service teachers and educational personnel, the reform of teacher education or production of new teachers and educational personnel, and the reform of measures to attract and retain good and

competent people to become teachers and educational personnel. Teacher education should be life-long education for continuous development of teachers and educational personnel who will serve as the firm foundation for the reform of the whole education system of the country.'

New economy & Teacher education

The Education Act was driven by changes such as globalization. Globalization has therefore had a significant impact on teacher education and school education reform in Thailand. On the economic front, globalization has expanded world markets, leading to greater mobility of production factors and increased trans-national investment. The global economic crisis began in Asia in 1997. One of the basic reasons for the Asian economic crisis was that Asian economics have not yet fully adapted their institutional structures, their business practices, or their policies to match the imperative of the New Economy.

'New Economy refer to a set of qualitative and quantitative changes that, in the last 15 years, have transformed the structure, functioning, and rules of the economy. The New Economy is a knowledge and idea-based economy where the keys to job creation and higher standard of living are innovative ideas and technology embedded in services and manufactured products. It is an economy where risk, uncertainty, and constant change are the rule, rather than the exception' (The Progressive Policy Institute, 1998, p.1).

'When we talk about the New Economy, we're talking about a world in which people work with their brains instead of their hands. A world in which communications technology creates global competition-not just for running shoes and laptop computer, but also for bank loans and other services that

can't be packed into a create and shipped. A world in which innovation is more important than mass production. A world in which investment buys new concepts on the means to create them, rather than new machines. A world in which rapid change is a constant. A world at least as different from what came before it as the industrial age was from its agricultural predecessor. A world so different its emergence can only be described as a revolution' (Browning and Reiss, 2003, p.1).

The New Economy needs to invest in a knowledge infrastructure, world-class education, training, science, and technology. Furthermore, companies need a set of policies and the skilled workers for the creation of new products among a changing world. The teacher is the person who can help develop the new economy. The role of teachers must change; they have to teach their students not only the bodies of knowledge, but also how to get knowledge. They must help create people with capacities for the global market place (The Progressive Policy Institute 1998; Asia-Pacific Center of Educational Innovation 1996). The Thai government has recognized the crucial role for teaching and teacher education in the reform of Thai economic and social environment and has placed education reform as a key to social and economic reform.

Teacher education must therefore respond to the profound global changes taking place in the world today. Education for sustainable development and a better quality of life for young people is a big responsibility for the profession. While globalization impacts our lives in different ways and meanings, its development is no longer the exclusive domain of the world of economics and the global marketplace. The challenge of globalization to education is to realize that the needs of learners are

the needs of the people. Education can help achieve the goal: creating people with capabilities for the market place. Matriano (2000, p. 4) suggests a 3-dimension framework for reforming teacher education which provides a valuable response to globalization. This triad consists of:

1. The Human being: the learner

- The learner must be at the center of this triad.
- The challenge is how to humanize education in the design of a teacher education program.
- How do we preserve our humane characteristic in the midst of scientific discoveries?
- Human rights education is basic to a quality life.

2. Planet earth: the setting for teacher and learning

- Teachers must be educated to combine their knowledge and skills to facilitate the learning of their students.
- To create a healthy environment to maximize learning.

3. Technology: the instruments of instruction

- Education and training programs for instructional technology are essential.
- Teacher education is critical and they must be literate and active users of technology.

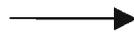
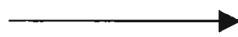
Finally, if we wish to live in a peaceful, sustainable world now and in the future, we have to change. A culture of peace is the link to the universal realization of human rights. The impact of global change is obvious: reform education, reform political and reform economics. As a result, enhancing the role of teachers by reforming teacher education, requiring codes of conduct, addressing issues of status and empowering

teachers *in situ*; and, integration as an essential in all aspects of education (Asia-Pacific Center of Educational Innovation for Development 1996, pp. 4-5). The role of teachers in a changing world is very important. To globally realize the human right to peace is the highest award. We can give to ourselves for all efforts, to reform teacher education for the new millennium (Mayor 1997).

Teacher education needs to develop a greater interaction and even integration between pre-service and in-service education. Besides, the teacher must be a leader for change. The teacher is a manager. The teacher's management role is wide-ranging and includes the management of children's learning; classroom management; the management of behavior; and the management of resources, including their own time allocation, priorities and knowledge base.

Characteristics of modern teachers for the new model of education

Teachers in the new system of Thai education according to the New Education Act are required to create their own knowledge, to think and create new things. Sinlarat (2000, p. 3) shows the chart of teacher's new roles as follow:

Old roles**New roles***Total centralization**Working independently in the district / School**Involved with the school only**Involved with the outside society**Teaching / supervising the middle-class**Teaching / supervising children of all groups and levels.**Not participating in the administration / management**Explicable to the outside (society)**Less self-development**More self-development**Using the knowledge of other people**Creating their own knowledge.*

The conditions of the new roles and the requirements for teacher professional development reflect the need to have a new model of teachers with new characteristics to respond to the transformation of education. Such a new model of teachers should at least have the following main characteristics:

- Having new visions and paradigms to see and understand the transformation.
- Having the critical thinking to view the causes and the effects of the problems.
- Having the creative and innovative thinking to be ready to improve and develop their own work all the time and to push the positive transformation through society and education.
- Knowing and understanding various kinds of children and their nature extensively in terms of economy, socio-cultural background and beliefs to be able to provide the environment for a group of learners and for an individual in order to create the self-learning process within the learners themselves.

- Having new teaching techniques according to the act, particularly in the development of thinking skills, management, problem solution, application, learning from real situations and always seeking for knowledge.
- Having new skills in creating and developing the contents of education and the local curriculums to be in line with the need of each area and these also include the selection, the development and the cooperation with the community in promoting Thai wisdom.
- Having the basic knowledge and ability in administration and management to be able to cooperate with administrators and faculty members in administering in the new direction that emphasizes quality and efficiency.
- Having the ability to teach, search, create new knowledge and disseminate their own work.
- Understanding, using and keeping up with the new technology in terms of the values, constraints and negative impacts upon life, education and society and being able to apply them efficiently (Sinlarat 2000, pp. 3-4).

In addition, the Asia-Pacific Center of Educational Innovation for Development (1996, pp. 8-9) suggests the new professional profile of teaching staff as follows:

- Teacher education programmes should be committed to developing teachers who can manage and facilitate life-long learning.
- Teacher education programmes should identify the knowledge base and conceptual skill needed for teachers to be managers and facilitators of life-long learning.

- Teacher education programmes need to meet the needs of the community and the society that they serve, using practical means.
- Teacher education programmes should focus on the development of problem solving skills.
- Partnerships should be developed between teacher educators, employers and teachers to facilitate the continuing professional education of teachers.

Thai teacher education most certainly needs to go through such extensive and comprehensive transformation. It is necessary to develop teacher thinking and autonomy for improved educational process. The emphasis must be on the development of critical thinking and creative thinking for teachers so that this can be also developed with their students in school classrooms. Being a thinker is part of what it means to be a developing person (de Bono 1994, p.5). In fact, critical thinking is an imperative component of decision-making and problem solving. Creativity is an important asset to develop in our students that will enable them to adapt successfully to the drastic changes which are taking place in our school and wider society.

Teacher education reform and the Faculty of Education, Burapha University

In the same way, the role of the Faculty of Education at Burapha University is a formal academic education environment for the future teachers of Thailand and is a proponent force in the research and development of professional education. Today, the Faculty of Education holds national recognition for its contributions to the study and practice of Education. The Faculty of Education has welcomed educational

reform with delight. In order to make the education reform possible, the teacher educators, too, have to change their roles and concepts (Faculty of Education, Burapha University n.d.).

Why questioning skills need to develop?

Student teachers need to develop skills to be effective teachers within the context of a changing world and Thai education reform. There are many skills which teachers need to learn and develop. The most notable shift is from the teacher centred learning environment to the student centred classroom. This change will have a very important impact of the daily teaching and learning practices of classroom and the work of the teacher especially. The effective teacher must prepare for the inquiry and student centred classroom by practising questioning and inquiry skills.

Questioning effects can be very powerful for learning and motivation to develop thinking and student centred learning. Asking questions requires thought. Moreover, questioning skills are central to the repertoire of effective teaching (Kyriacou 1998, p. 34; Eggen and Kauchak 1996). Wilen (1991, p. 32) asserts that higher cognitive level questions encourage students to think critically. Barry and King (1993, p. 126) explain the purpose of questions, among other things, is to arouse interest, summarize major points, encourage discussion, stimulate inquiry, check on class progress, routines and behaviors, maintain attention and evaluate learning. Despite the scope and frequency of teacher questioning that is demanded in student centred classrooms, it is a very difficult skill to master. Good questioning is very complex as well as

powerful. Cole and Chan (1987) argue that questioning engages students in verbal interactions with teachers about important aspects of subject matter.

Before commencing this research, the lecturer teaching the classes which are central to the research, observed in previous years that ninety percent of student teachers who studied the General Methods of Teaching couldn't question and participate in class activities. They did not like to think, discuss, question and answer. Effective teachers need to promote and enhance thinking and questioning skills. These are key factors of education reform and for building the capability of teacher education to respond effectively to the changes being driven by the Education Act.

As a lecturer in the Department of Curriculum and Instruction, Faculty of Education, Burapha University, Thailand, the researcher became interested in studying how to facilitate the development of student teachers' questioning skills. Using action learning and research practices with student teachers in the Faculty of Education, it was found that student teachers do not respond well to lecturer questions, at least not in the critically reflective way that is demanded for encouraging school students to think. Furthermore, the student teachers in these classes at the University could not set questions in their plans for teaching which promote school students' thinking and participation in class activities. Both the school and university classroom climate was very quiet and students did not engage in discussion of ideas and activities. Being aware that it is very difficult for student teachers to set questions is a fundamental first step in identifying the need to educate student teachers to be involved in develop skills for asking questions.

Questioning is one of the most important skills in effective teaching. In understanding the nature and purpose of questioning, it is important that teachers be able to classify and ask questions at different levels of thinking, from closed questions to complex and open-ended questions. Good questioning has the ability to trigger and develop critical and creative thinking (Wilson and Wing-Jan 1993, p. 67).

Significance of this research

Questioning is a skill which must be developed to support future sustained educational improvement. This research develops new knowledge about the role of the teacher educator, the development of teacher education and the work of student teachers as they learn to construct, master and apply the questioning skills required of teachers. Through action research with student teachers, a model for developing and improving student teachers' questioning skills will be developed. Additionally, this research will inform the current search for a new model for teacher education in Thailand and will inform teacher education internationally, particularly where similar reforms are being implemented. The result of this action research is that learning will be improved as it happens in the school and university classroom and strategies for enhancing teachers' questioning skills will be developed. Enhancing the questioning skills of the lecturer and the student teachers will lead them to be more effective teachers and develop their professional research skills as well.

Research question

The key focus for this research responds to the demands outlined above and the research principal question is: *What teaching and learning approaches assist the development of student teachers' questioning skills?*

Objectives of the study

The study investigated:

1. the development of the teaching of questioning in the University teacher education classroom as well as the school classroom
2. reflective practice for development of teaching competence
3. systematic inquiry and reflection on the researcher's teaching and learning to implement change for improvement in practice.

Overview of the thesis

This thesis presents systematic teaching and learning approaches which focus on the developing explicit thinking and questioning of student teachers in the Faculty of Education Burapha University, Thailand. It reports a new role of teachers and teacher education in the context of Thai education reform. It contributes significantly to the knowledge about student teachers and ways to develop their questioning and thinking skills. Moreover, the research reflects practice for development of teaching competence of lecturers in the university as well.

Chapter 2 includes a comprehensive overview of the literature and the research on the knowledge-based economy, inquiry curriculum approaches, Bloom's taxonomy as a framework of developing thinking process, independent and lifelong/career-long professional learning for teachers, teaching thinking skills, creative thinking, critical thinking, de Bono's Six Thinking Hats, co-operative learning, higher-order thinking, strategies to develop reflective and metacognitive thinking, questioning and answering, good questions, classroom environment, action learning, reflecting teaching learning, self and group assessment, teacher attitudes and teacher professional development.

Chapter 3 outlines the methodology used to gather this information and the rationale for what is the process of action research. There are four stages of the research and two cycles of implementation in the university classroom. In this chapter the steps for the data collection and how the data were analyzed are outlined.

Chapter 4 and Chapter 5 report the findings of Stage 1 (Cycle 1) and Stage 3 (Cycle2). Chapter 6 and Chapter 7 present the final analysis of the research, findings and propose recommendations for further development, including what new ideas, knowledge and practices of teacher education in Thailand should look like.

Chapter 2

Literature Review

Introduction

In Thailand in 1999 the National Education Act was declared (Office of the National Education Commission 2000b). This had a significant impact on policy for educational reform in Thailand. The new policy stressed the development of teacher education and commenced the search for a new set of characteristics which were required of teachers and so for education of student teachers. The National Education Act indicated the need for student teachers to change and for teacher education to adjust its concepts of teaching and learning in university and school. The Act supported teachers who are facilitators, managers and researchers. Teachers in schools need to help their students to develop a range of skills for independent learning and inquiry.

A focus on thinking and questioning skills was identified so that students in classrooms can learn in a range of ways and respond to many teaching approaches. Well-developed thinking skills were considered very important for success in a changing world and as such, are central to educational reform in classrooms in Thailand. Enhancing thinking

skills is a key issue for growth and development identified by the National Education Act (Office of the National Education Commission 2000b).

A leader of these education reforms is the Faculty of Education at Burapha University which is developing new approaches for training student teachers for the new millenium. The Faculty's critical role is how to educate students to be effective teachers. There are many skills required in teaching and to be good teacher. However, teacher questioning is an essential skill of effective teachers because it promotes the development of thinking skills of school students as well. Questioning and discussion are indicators of learning and stimulate reflection on ideas, experiences and thinking (Moore 1998, p.254). Tubsri, the Dean of Faculty of Education Burapha University, Thailand says that...

'In recent years, there was an outcry about the quality of education in Thailand, school, colleges and university were accused of not having performed their duties correctly. Schools were blamed for too much emphasis or memorizing contents instead of helping students to learn, think, and live with others peacefully. Colleges and universities are still doing teaching telling the subject matter, instead of enabling student teachers to learn. The graduates are too narrow in many aspects' (Faculty of Education Burapha University n.d.).

Khemmani (2002b, p.44) stresses the process of thinking development for teachers to apply in their teaching and learning process in school. Five techniques were identified. They are brain gym, graphic organizers, questioning, Six Thinking Hats and the learner

centred teaching and learning model called CIPPA (Construction of knowledge, Interaction, Process skills, Physical participation and Application).

This research is concerned with the teaching and learning of questioning strategies and the development of these skills for student teachers. It involves the reflective practice of teachers, student teachers and students in the university and school classroom. For student teachers to question better, they are required to plan and implement change systematically. Therefore, student teachers need to learn in action. They need to learn to think themselves and reflect their own thinking. Moreover, student teachers need to learn in cooperative environments with other persons. These help them not only to learn to question and answer better but also to be self-confident in teaching. It is necessary to facilitate student teachers' questioning skills and to be aware of and to be careful in teaching and learning approaches which assist the development of student teachers' questioning skills. This review of the literature examines the following concepts to support the analytical framework for this research as follows:

1. Knowledge-based economy
2. Inquiry approaches
3. Inquiry Learning in the Thai educational context
4. Bloom's taxonomy as a framework of developing thinking process
5. What is learning?
6. Independent and lifelong/ career-long professional learning for teachers
7. Teaching thinking skills
 - a. Creative thinking
 - b. Critical thinking

- c. Six Thinking Hats
 - d. Cooperative learning
8. Higher-order thinking
 9. Strategies to develop reflective and metacognitive thinking
 10. Questioning and answering
 11. Good questions
 12. Classroom environment
 13. Action learning
 14. Reflective teaching and learning
 15. Self and group assessment
 16. Teacher attitude
 17. Teacher professional development

1. Knowledge-based economy

'Education for this new century will be based on visions of how people can live their lives, of the kinds of communities they will inhabit, and the kinds of relationships they will have with each other. These visions are currently being rethought as a result of major economic, political and cultural changes, subsumed in the concept of globalization, and through notions of the roles and entitlements which people will experience, captured in the idea of citizenship' (Gilbert 2000, p. 50).

Globalization impacts countries in all communities. Advances in information technology have brought about rapid globalization, and this indicates a need for the formulation of new world economic and social orders and for the re-evaluation of international relations. Gilbert (2000 p. 50) states that globalization refers to a different but pervasive process which is changing the nature of relations among the world's peoples. In addition, economic, political and cultural changes raise questions about the kind of education needed to prepare students for this new world. Economics adds value to products and services, especially to the ones that will provide a higher standard of living for their citizens, many of whom will work in the knowledge-based industries of the future. This paradigm shift from the resource-based economy to the knowledge-based economy will raise great challenges for the education sector as well as the economic sector. In the knowledge-based economy of the twenty-first century there will be great demand for citizens who can think of possible solutions to problems, many of which will require original thinking (Smith and Coombs 2002, p. 1). Most especially, teacher education should be rearranged to meet the need for increasing competitiveness of school education in the knowledge-based society. The effectiveness of schooling for producing knowledgeable workers is considerably dependent on quality and professionalism of teachers.

Elliott (2000) proposes that teachers have a key role in disseminating new knowledge in the information society. The teacher is the person who can help develop the new economy. The role of teachers must change; they have to teach their students not only the bodies of knowledge, but also how to get, understand and apply knowledge. They must help create students with capacities for the global market place. Teachers for the

new millennium need to be multi-dimensional with attributes of reason, intuition, emotion and imagination (Elliott 2000, p.9). In Thailand, reforming teacher education is a part of the educational reform needed to lead and participate in the knowledge-based economy (Office of the Development of Economic and the Center of Science and Technology 2003, p. 10).

Furthermore, Elliott (2000, pp.6, 8-9) suggests that teachers must possess new concepts and an understanding of the idea of learning, understand a new type of relationship between universities and schools, and of the learning processes for students. This will require trust and professional development in a way that has not even been tried in the old world but must be worked through in the new world. Besides, Elliott asserts that the teachers need to have an inquiry approach with regard to their work and so agreeing with the general direction declared in the Education Act that this is a critical feature of the way teacher education needs to develop in Thailand. Teachers must think critically, reflectively and creatively and invest their heart, mind and body in the task.

Sinlarat (2000, p.6) recommends that Thai teacher education should be aware, conscious and understand, as well as seek appropriate methods and directions for inquiry in a knowledge-based economy. Hence, teachers need to think critically and creatively to promote student learning and to develop thinking processes. Eggen and Kauchak (1996, p. 55) state that expert teachers go beyond essential teaching skills to promote higher-order and critical thinking in their students. Teaching for thinking and deep understanding of content cannot be separated and expert teachers simultaneously teach both. Young (1998) notes that reforms in teacher education require rethinking in terms of

how students learn to become a teacher as well as what they learn. So, critical thinking is necessary to manage in the knowledge-based economy, to find good solutions to problems and to judge ideas. Such thinking consists of the set of skills needed to solve a problem. Moreover, the teaching of creative and critical thinking in schools is a high priority in many countries, and especially in the emerging nations such as Thailand which is explicitly attempting to reform its education system using inquiry approaches to prepare for a knowledge economy (Office of the National Education Commission 2000a).

2. Inquiry approach

The inquiry approach is based on the 'inquiry method' as applied to teaching and learning (Poynter, Pigdon and Woolley 1991). Woolley and Pigdon (1997, p. 30) state that the inquiry approach to learning and teaching provides conditions that allow learners to take control of their learning, to build on their prior knowledge, to make and test predictions, to gather and organise information and to synthesize their findings. Moreover, Woolley and Pigdon claim inquiry approaches require teachers to develop the capacity to view knowledge differently and to have a personal conceptual framework of what learning is and the shape and purpose of the inquiry. The educational outcomes associated with inquiry approaches to learning and teaching can be classified into two main categories: content outcomes and process outcomes. It is important that both types of outcomes receive adequate attention if a balanced curriculum is to be developed.

Marsh (2001, p. 215) explains a conceptual model which reveals three dimensions of inquiry that are critical: the inquiry atmosphere, the procedural continuum and the

content continuum. The inquiry atmosphere is an over arching dimension and consists of the socio-psychological background of the class, including in particular the quality of interactions between the teacher and the students. The procedural dimension refers to the set of procedures or steps required for an inquiry activity. Finally, the content dimension refers to the concepts and understandings that a student brings to bear on an inquiry situation.

Teachers working in an inquiry-based classroom must make explicit the skills necessary to support students becoming independent learners. Such teachers model effective questioning, decision-making strategies, the planning of investigations and the communication of information to different audiences. The inquiry approach challenges teachers to focus on the learning needs of their students. It challenges students to become active, independent learners. It is often referred to as a learner-centred approach or constructivist approach which includes the active engagement of students in their learning and encouragement of students to construct their knowledge, skills, attitudes and understandings (Roe 2000a).

Wilks (1995, p. 8) suggests that for students to develop a sound inquiry approach they need to be part of a community of inquiry. Fisher (2003, p.55) explains that

‘A community of inquiry can help children develop the skills and dispositions that will enable them to play their full part in a pluralistic and democratic society. It boosts self-esteem, intellectual confidence and the ability to participate in reasoned discussion. It achieves this by creating a caring classroom community where children learn to:

- *explore issues of personal concern such as love, friendship;*
- *develop their own views, explore and challenge the views of others;*
- *be clear their thinking, making thoughtful judgement based on reasons;*
- *listen to and respect each other;*
- *experience quiet moments of thinking and reflection.*

Pearl and Knight (1999, p.98) indicate that in the classroom the teacher should be making the environment and teaching practices consistent with democratic principles to support the student led inquiry and curriculum. Democratic citizenship skills should be developed through action and reflection. Democratic citizenship is designed to generate action for the betterment of the community.

The role of teachers in a democratic classroom which develops as a community of inquiry is important as they are both guide and facilitator (Lang, McBeath and Hebert 1995; Wilks 1995; Roe 2000a). Wilks (1995, p 2) states that

‘The teacher’s role is to facilitate the inquiry, which works best when all members of the group participate. Each member of a community of inquiry needs the opportunity to translate the experience into something meaningful for them. Having one’s ideas examined is a personally rewarding experience, even when agreement is not achieved.’

Roe (2000b) agrees and proposes a range of activities, which will enable students to become comfortable with the shift of responsibility for their learning, from teacher to students. Most importantly students will need to develop skills and understanding on how to work cooperatively with other students Cherednichenko (2001, p.1) presents inquiry as

a response to the need for and nature of wonder through philosophical inquiry in education. She states that the

‘Development of critical awareness of teachers’ thinking about student learning is the essential approach which can inform choice and action, improve student learning outcomes for all students and prepare tomorrow’s community leaders for more thoughtful and democratic practice.’

A community of inquiry approach assumes both the teacher and students are learners. They learn to investigate approaches to constructing knowledge independently and collaborative as a community. The process of teaching and learning is very important in supporting the goal of effective learning. Teachers recognize the role of inquiry, support for students to learn and think, reflection on classroom teaching as well as the importance of evaluation and development. In response, Lang et al (1995, p. 289) state that teachers must plan and promote curriculum related inquiry instruction to challenge students and help them take increasing responsibility for their own learning.

3. Inquiry Learning in the Thai educational context

In the Thai context, teachers are aware of the need to be improving teaching and learning. Teachers will need to facilitate student learning continually. Thai teacher education reform began after the declaration of the National Act in 1999. This Act can be considered as the significant stimulus for a shift in paradigm. The concept and the guidelines proposed in the Act are designed to make education go through the drastic transformation. If the teachers are challenged to provide an environment where learning

how to learn and leading students to be lifelong learners is important, then teacher thinking about student learning will also need to be developed. Teachers will be required to develop their own professional knowledge, to think and create new ways in their districts and schools for a change in teaching to a learner-centred approach.

Section 22 in the National Education Act states that

‘Education shall be based on the principle that all learners are capable of learning and self-development, and are regarded as being most important. The teaching-learning process shall aim at enabling the learners to develop themselves at their own pace and to the best of their potentiality.’

(Office of the National Education Commission 2000b, p. 10).

Teachers are asked to encourage students to be able to think, do and learn themselves as well as take part in evaluation of learning development in accord with their potential, needs, interests and aptitude. Hence, in the classroom the process is designed to enable learners to:

- Think, do, act and construct their own knowledge about matters relating to their lives from a variety of learning sources;
- Participate in the identification of objectives, activities and learning methods as well as learn happily with others; and
- Participate in evaluation of learning development (Office of the National Education Commission 2000a, p. 26).

There is limited research on the teaching of thinking, questioning and inquiry and on innovative approaches to teaching and learning in the Thai context and in this way, this research is critical for the development of new knowledge about these ideas in Thailand.

However, this section presents a critical overview of key thinkers and researchers in educational and pedagogical reform in Thailand in recent years. The literature consistently calls for further development in the education of teachers, improvement in their practices and an increasing emphasis on inquiry and more democratic and engaging classrooms.

Sucharekul (1978) studied the inquiry behaviour preference and performance of Thai science teachers. In her conclusion, she indicated that Thai teachers should be given more training and practice in the use of questioning, and more training and practice in using classroom climate control behaviours that encourage students to participate in inquiry. Positong (1980) similarly concluded that the emphasis of teaching science as a process of inquiry depends upon the teacher's ability to develop questioning skills, probing, and encouraging behaviors. Teachers, like students, will need further education in the use of questioning skills, probing and encouraging inquiry behaviours before they can teach science as inquiry in their classrooms.

Questioning is significant in teaching to promote student thinking. Teacher and student teachers need to develop and be educated in how to formulate good questions. However, students in the school must ask and answer questions as well. In Thai context teaching thinking emphasizes to foster in the university and school classroom too. Somsak (1997) developed an instruction model to improve critical thinking of the students in the project of basic education. The model aimed at teaching six stages of critical thinking: defining the problem, gathering information, organizing, hypothesizing, inferring and evaluating inferring. The content of the model consisted of specific tasks of thinking activities as

separate program not integrate into core subjects in the curriculum which enable students to master successively five stages of learning process: presenting situation, individual thinking, small group thinking, discussion, and evaluating metacognition. The purpose of this research was to find an efficient instructional model based on the 80/80 standard. The critical thinking of the subjects in the experimental group and the control group were compared. The critical thinking of the subjects was tested before intervention, after the training period and at the end of the follow-up period. So the interaction of the critical thinking developmental model and the time teaching were the important variables to study. The efficiency of instruction model result was higher than the set up standard. This meant that the instruction model was highly efficient. The critical thinking of students in the experimental group was significantly higher than for the control group. The critical thinking of students in the experimental group was significantly higher for intervention scores, post-test scores and the follow-up scores than those in the control group. Although this research indicated the benefits of thinking programs they have not been widely adopted in Thailand.

Knemmani (2000, pp.77-78) states that in Thailand teaching thinking has been discussed for many years. The approaches support being good thinkers to improve social and personal action and to a good problem solving person. Additionally, she suggests Yosomanasika's approach is a technique of teaching thinking in Buddhism. By 1999 the reform of education in Thailand was happening, the policy of teaching thinking and development thinking process is influential. Furthermore, a learner-centred approach is considered vital in the learning reform as well.

As a result, Suwancharas (2000) studied the effects of training in mind-mapping techniques on the critical thinking of the secondary school students. The subjects were one hundred and sixteen Mathayom Suksa year two secondary students (Grade 8). Each group was randomly assigned into an experimental group and a control group with fifty-eight students in each group. The experimental group was trained through ten activities using the mind-mapping technique while the control group performed usual activities. A critical thinking evaluation test was administered to all participants before and after the training in mind-mapping was offered to the experimental group. The results indicated that the students in the experimental group obtained higher scores for the post-test critical thinking evaluation than those in the control group, and that also the students in the experimental group obtained higher post-test scores than pre-test scores.

Bumrerraj (2000) investigated the language usage behavior of student teachers who undertook practise teaching in the school during the 2000 academic year. The population was forty-one student teachers from the Faculty of Education at Burapha University. They were the fourth year students completing a major in mathematics. The instrument used in this research was an adaptation of Flander's verbal behavior instrument. The results of the research show that the student teachers in mathematic illustrated behavior which was teacher-centred (based verbal instruction and direction) more than student-centred (based on students asking questions). Moreover, the student teachers did not motivate the students in the school classrooms to create the questions and present their ideas. Accordingly, Khemmani (2002a, pp.26-27) presents a framework for quality teaching which promotes student learning. There are three factors outlined that teacher need to understand. These are the learning process, the teaching process which is needed

to enhance the learning process and the model of teaching or teaching methods that achieve the goals. Understanding these components will support teacher thinking and planning of lessons. In addition, teachers must apply inquiry approaches in teaching and learning. Teachers must choose the model of teaching and teaching methods to facilitate learner success.

The models of cooperative learning, group discussion and circular response were illustrated and considered. The research stressed that teachers need to ensure that they have appropriate facilities, resources and materials, and that students are adequately prepared for inquiry instruction. They need to focus on 'process' rather than 'product' alone. Bloom's taxonomy (1956) for example highlights a framework for constructing curriculum for inquiry processes of learning and knowledge acquisition and which helps teachers understand how to develop inquiry instruction for the development of higher order thinking.

4. Bloom's taxonomy as a framework of developing thinking process

Teachers should be clear about the objectives to provide opportunities for further systematic learning. Lefrancois (2000, p. 496) claims objectives are desired outcomes. School-related objectives include both the specific instructional objectives of teachers and the wider objectives of curricula, programs, principals and communities. Arguably, the best-known taxonomy of educational objectives is Bloom's (1956). A taxonomy of educational objectives, it is an exhaustive list of possible educational outcomes that can serve as a guide for instructional objectives.

Educational objectives mean explicit formulations of the way in which students are expected to be changed by the educative process. This is the way in which they will change in their thinking, their feeling and their action (Bloom 1956, p. 26). Three basic taxonomies have been developed covering the cognitive, affective and psychomotor domains. Within each domain there is a hierarchy of categories (McInerney and McInerney 1998, p.301). Taxonomy is used as a tool for helping make decisions about instructional objectives. It can be used to assist in test construction and in choosing a questioning strategy as well as for curriculum design. Bloom's taxonomy provide a good reminder that we want students to learn a variety of skills and to be able to think and act in a variety of straightforward as well as complex ways (Arends 2001, p. 61-63).

The taxonomy for the cognitive domain stresses knowledge and intellectual skills (Snowman and Biehler 2000, p. 331). The cognitive domain provides a framework of developing thinking processes. Bloom's system specifies a sequence of six stages. Figure 2.1 summarizes the different Bloom levels and provides examples of questions that best reflect each level. Figure 2.1 represents a matrix which connects and compares frameworks for thinking from Bloom (1956, pp. 201-207); Wilson and Wing-Jan (1993, p. 49); Dalton, Joan and Smith (1986); Sprinthall and Sprinthall (1990, p. 355) and Gronlund (1981, p. 569). This hierarchy will inform the research as the development of questioning skills is encouraged from information seeking questions to questions which seek deeper reflection, understanding and idea development.

Figure 2.1 Detail of Different Bloom Levels and Provides Examples of Questions that Best Reflect Each Level to Promote Thinking Process

Thinking Process	Useful Verbs	Questions
1. Knowledge - Know common terms - Know specific facts - Know methods and procedures - Know basic concepts - Know principles	tell, list, describe, relate, locate, write, find, state, name, select, define	Questions require factual recall material - What is? - Who is? - How much is? - How did? - When was?
2. Comprehension - Understands fact and principle - Interprets verbal material - Justifies methods and procedures	explain, extend, interpret, outline, discuss, distinguish, predict, restate, translate, compare, describe, give example, paraphrase, predict, extend, defend, summarize, estimate	Questions require the student to think more broadly, to show more in-depth understanding to explain using his/her own words. - How are these ideas similar to? - Demonstrate the meaning of - Paraphrase in your own words, - Give an example. - Explain the meaning of
3. Application - Apply principles to new situation - Apply theories to practical situation	solve, show, use illustrate, calculate, construct, complete, examine, classify, change, demonstrate, manipulate, modify, operate, predict, prepare, produce, relate	Questions ask the student to apply learning to a new situation or to develop a product. - What would happen if.....?
4. Analysis - Recognizes unstated assumptions - Recognizes logical fallacies in reasoning - Distinguishes between facts and inferences	analyze, distinguish, examine, compare, contrast, investigate, categorize, identify, explain, separate, advertise, infer, point out,	Questions are designed to ask students to take the material apart and examine the pieces. - How are The same,....and how are they different?
5. Synthesis - Writes a well-organized theme. - Writes a creative short story. - Proposes a plan for and experiment. - Integrates learning from different area into a plan for solving a problem	create, invent, compose, predict, plan, construct, design, imagine, improve, propose, devise, formulate, organize, categorize, combine, compile	Questions attempt to get the student to go beyond our present knowledge. - Describes the three major theories, and show they may be combined..... - Writes an essay proposing a new solution to the problem of - Which best illustrates a new way to understand.....? - What advice would you give to help.....?
6. Evaluation - Judges the value of material for a given purpose. The judgments are to be based on definite criteria.	judge, select choose, decide, justify, debate, verify, argue, recommend, assess, discuss, rate, determine, conclude, criticize, summarize, interpret, support	Questions are designed to require the student to evaluate ideas according to an explicit and detailed set of reasons. The system of judgment employed must be clearly explained. - What is the strength and weakness? What option do we have for improving working conditions and? - What do you favour? Why.....?

5. What is learning?

Learning results in a change in behavior. Students have learned when they can demonstrate new knowledge and skills presented to them by teachers or through another experience (Reeve 2002, p. 8). Ormrod (1998, p. 215) defines learning as a relatively permanent change due to experience. Kolb (1984, p. 36) suggests learning is the process of creating knowledge through the transformation of experience. The emphasis is the process of adaptation and learning as opposed to content or outcomes. Moreover, knowledge is a transformation process, being continuously created and recreated. Moon (1999, pp. 116, 135) states the stages of learning are noticing, making sense, making meaning, working with meaning and transformation learning. This relates to deep learning. This deep learning is making meaning, working with meaning and transformative learning. Biggs and Moore (1993, p. 332) say

‘ three approaches to learning have been distinguished, on the basis of extrinsic, intrinsic and achieving motivation, each involving characteristic strategies for approaching learning, which we call surface, deep and achieving respectively. The surface approach is a tired, impersonal reaction to an uninspiring work demand, with rote learning usually playing a major part. The deep approach is an energetic involvement to maximize meaning. The achieving approach is a calculated attempt to maximise marks cost effectively. Good students typically have elements of both deep and achieving approaches. ’

Some studies have shown that the outcome of student learning is associated with the approaches they adopt. Deep approaches are often related to higher quality outcomes.

On the other hand, surface approaches are often associated with poor outcomes and link to negative attitudes to study (Ramsden 1992).

Learning and achievement of students include change both in their behavior and in their ways of thinking. Understanding learning will be useful for teachers to identify strategies for helping students learn more effectively. Sprinthall and Sprinthall (1990, p. 279) state that learning in the classroom involves the concept of transfer. What is learned in class is thought to transfer into later-life situations, so as to enable the learner to earn a living and enjoy a fuller life. Pappas and Tepe (2002, p. 30, 32) suggest inquiry learning is student centered which means that students have ownership in the process rather than pursuing a project that has been assigned by the teacher. Moreover, inquiry learning changes traditional roles of students and teachers. In the inquiry approach, as outlined earlier, the teacher, as coach, monitors the learning activities of students and interacts with students to keep them on track.

In traditional approaches, students relied on teachers to tell them how to and when to do what (Wilson and Wing Jan 1993, p. 6). It based on behaviorism theory. However, the recent developments in student learning have been based a constructivist philosophy (Moon 1999, p. 106). Pappas and Tepe (2002, p. 26) assert their understanding of the differences between behaviorism and constructivism as learning theory as follows:

Figure 2.2 Learning Theory

Behaviorism	Constructivism
Traditional curriculum design is characterized by: <ul style="list-style-type: none"> • teacher as knowledge provider • student as passive learner • curriculum as a confined body a confined body of knowledge • assessment as test 	Constructivist curriculum design is characterized by: <ul style="list-style-type: none"> • teacher as guide • student as active learner • curriculum that reflects essential understanding • authentic assessment (i.e., performance demonstrations)

In addition, Wilson and Wing-Jan (1993, pp.6-7) outline two paradigms of learning, traditional and independent reflective. The new paradigm of the independent reflective approach encourages active responsible learners. It empowers learners to make their own decisions, provides time for them to reflect on what they have done well and on what they have need to do to improve, and it supports learners in their endeavors to set their own goals.

Pappas and Tepe (2002, p. 35) suggest the learning environment in a traditional school tends to be closed with limited connection to the community. Teachers instruct in their self-contained classrooms. In a constructivist classroom, the learning environment is opened, with many connections to the learning community. It is important for teachers to understand that the move from a traditional classroom to a constructivist and authentic setting does not happen overnight but rather takes time and experience. Moreover, Moon (1999, p. 117) states that a learning environment is a complex mix of factors that affect learning in an individual or a group. In a learning environment, many factors interact in variety of way. The ecological notion of ‘limiting factors’ is a useful concept with much relevance to the interaction of factors, so as to facilitate good quality learning.

Loughran (2002, p. 10) suggests principles of teaching for quality learning. These are defined as follows:

1. *Share intellectual control with students*
2. *Look for occasions when students can work out part (or all) of the content or instructions*
3. *Provide opportunities for choice and independent decision-making*
4. *Provide a diverse range of ways of experiencing success*
5. *Promote talk that is exploratory, tentative and hypothetical*
6. *Encourage students to learn from other students' questions and comments.*
7. *Build a classroom environment that supports risk-taking*
8. *Use a wide variety of intellectually challenging teaching procedures*
9. *Use teaching procedures that are designed to promote specific aspects of quality learning*
10. *Develop students' awareness of the big picture*
11. *Regularly raise students' awareness of the nature of components of quality learning*
12. *Promote assessment as part of the learning process.*

Jepperson (2002, p. 113) in his study shows which teaching practices support quality learning. These are: maintain the interest levels of the students; develop good relationships between teacher-student; build more stable class dynamics; and enable all students to feel comfortable with taking risks. This will assist more systematic and purposeful approaches to promoting quality learning and more students will display characteristics of independent learning.

In higher education, teacher educators seek to create the conditions for learning which result in deep transformational learning practice relating to the effect of the learning potentially in the learner. Bloom's process of learning describes these as deep and surface categories of learning behavior. Three domains of learning have been applied from Bloom. These domains of learning are the cognitive and knowledge (K) domain, feeling and emotion (E) domain and the domain of action or interaction with the world (A) (Brockbank and McGill 1998). Pappas and Tepe (2002, p. 98) state that...

'Today we understand that learners construct knowledge through social interaction. A higher level of interaction occurs when the members of the group share information, collectively develop new understanding through synthesis and synergy, and communicate that new knowledge, showing a transformation in their thinking.'

In addition, Pappas and Tepe suggest making the change to inquiry learning requires significant time spent in professional development for teachers because inquiry learning is fundamentally a different way of teaching from that which they experienced themselves as students. It means changing the learning environment in the classroom and the school (2002, p.39).

Teachers should understand learning theory, the process of learning, the learning environment and strategies to develop learners and leading them to learn how to learn. Learners learn to construct new knowledge, develop thinking process and emotion, so teachers need to become facilitators and coaches who arrange meaningful learning experiences and activities for learners.

6. Independent and lifelong/career-long professional learning for teachers.

Professional learning has different meanings in different contexts. As far as 'teaching' is concerned, the promotion of the term has been inextricably involved with questions of status, salary and autonomy (Asia-Pacific Center of Educational Innovation for Development 1996, p. 9). Stringer (1996, p. 61) states that teaching is such a demanding and challenging profession because of the relationships teachers can create between themselves and their learners. They can enable even the students who seem most unlikely to learn to have the confidence to realize that they can learn. Calderhead and Shorrock (1997, p. 15) claim the tasks intrinsically involve teachers' personalities and part of teachers' professional development requires teachers to engage in self-learning, becoming aware of their own personal qualities and how other people respond to them. Donnelly (1992, p. 94) proposes a professional development strategy for teachers. He suggests the key elements in career development for teachers which are necessary for personal and professional development in the teaching profession are:

- Self-awareness
- Self-presentation
- Regular self-analysis of both yourself and your career
- Continuous self-education.

If these elements are well attended to, then teachers are likely to become effective educators and experience job satisfaction.

As a teacher, part of professional development is centred around questions such as How do we improve teaching? The answer to the questions reflects learning in the teaching

profession for all professionals when, as Light and Cox (2001, p. 43) assert, the heart of concept of the reflective professional, the three central worlds of student, teacher and researcher, is deeply and theoretically interrelated. Reflection has recently become a popular term in the context of teachers' professional development. Calderhead and Shorrock (1997, pp. 16-17) explain writings on reflective teaching have considered what the cognitive, affective and behavioral components of reflection might be. They also wonder what are the skills, knowledge basis, attitudes and predispositions that make reflection possible, and how might these be facilitated amongst teachers at different stages in their career?

Light and Cox (2001, p. 224) say that reflection must *'address the social and epistemological issues and values of the professional role of teaching which challenges academics to reflect upon and think about their teaching in the changing wider social, political and economic contexts in which it is situated.'*

A reflective teacher is an inquiring professional who should:

- Be engaged in a process that seeks continually to improve their teaching and students' learning;
- Share their experience with colleagues and seek feedback on their performance;
- Be aware of the socio-cultural and psychological context of students and its influence on their learning;
- View classrooms as sites for innovation and creativity;
- Seek to engage students in active learning.

A reflective teacher is deemed to be one who is open-minded, dynamic, flexible, innovative, creative, questioning, respectful of the views of others, confident in their own ability, sensitive to what is happening in the classroom and the wider social context. Further, a reflective teacher is able to connect instruction, curriculum and students, share with other teachers, work collaboratively, has a vision for teaching and learning, and promotes active learning (Asia-Pacific Center of Educational Innovation for Development 1996, p. 11).

Reflective teachers inquire about their own practice so that they know that it is critical that changes need to be made in order to bring about 'better' and 'more' learning. Effective teachers will know how to make those changes and have a chance or a need to try something new. Effective teachers are thinking teachers who develop self-awareness and self-observation through a reflection on teaching. These are teachers who are also lifelong learners. Longworth and Davies (1996) recommend lifelong learning through which individuals should each take responsibility for their own learning and write down a personal learning plan and keep a learning passport. Successful lifelong learning motivates individuals to participate in the learning process. Moreover, it is enjoyable and of tangible benefit to the individual and/or the organization. The teacher is a lifelong learner, who engages in reflective dialogue about teaching practice and who therefore is a 'thinking' teacher too. Reflective practice helped teachers to be aware of developing metacognition and teaching. Thinking process development should be considered and planned in both teachers and learners. Lifelong learners must be thinkers.

7. Teaching and thinking skills

Thinking process development is very powerful for the new millennium because thinking creates imagination, which impacts on producing innovation, technology, science and art. de Bono (1999, p.280) has shown that ...

‘The new millennium needs people who want to do better. Thinking has been and will continue to be the key tool for designing a better future. Thinking can be improved and made more constructive. It can be done. But only if we start to do it. A few people have started.’

We need clever thinking in order to make even better use of information that is also available to our competitors. Thinking is a skill that can be improved by training, by practise and through learning how to do it better (de Bono 1994, p. 1). Thinking is an art and any mental activity that helps formulate or solve a problem, make a decision, or a desire to understand. Observation, remembering, wondering, imagining, inquiring, interpreting, evaluating, and judging are among the most important skills to develop (Ruggiero 1988, p. 2). Moreover, de Bono (1994, p. 3) states that thinking is the procedural skill which occurs when intelligence acts upon experience. Baron (2000, p. 5) argues thinking is important for daily lives. The way of thinking affects planning, choosing personal goals and decision making, so actions, beliefs and personal goals can be the result of good thinking.

de Bono (1993, pp. 221-223) suggests twelve principles for practical thinking as follows:

1. Always be constructive
2. Think slowly and try to make things as simple

3. Detach ego from thinking and be able to stand back to look at thinking
4. What is the focus and purpose of thinking?
5. Be able to 'switch gears' in thinking know when to use logic, when to use creativity, when to seek information.
6. What is the outcome of thinking? Why do I believe that it will work?
7. Feelings and emotions are important parts of thinking but their place is after exploration and not before.
8. Always try to look for alternatives, for new perceptions and for new ideas.
9. Be able to move back and forth between broad-level thinking (concept, function, abstract level) and detail-level thinking.
10. Is this a matter of 'may be' or a matter of 'must be'? Logic is only as good as the perception and information on which it is based.
11. Differing views may all be soundly based on differing perceptions.
12. All actions have consequences and an impact on values, people and the world around.

These twelve principles for thinking describe the scope and the importance of conscious thinking. Some of the principles are concerned with how we operate the skill of thinking, other principles are concerned with the practical use of that skill. These skills are as important for students as they are for teachers. In school and university and in the home and community, an emphasis on explicit thinking and metacognition helps learners learn and develop their quality of life. Students should be able to solve problems. Moreover, thinking provides an interesting and positive way of interacting with others. It can be learned and constructive thinking is important for the future well-being of the society.

de Bono (1994, p. 6) proposes that every education system anywhere in the world claims that one of the prime purposes of education is to teach students how to think. Yet, thinking as such has never been taught explicitly in education. Those making the decisions have experience and values based only on the past. But in the globalised and technologically advanced world, teaching students knowledge alone is not enough. The creative, constructive, design and operating aspects of thinking are just as important as knowledge.

Haynes (1997, p. 1) asserts in the article on teaching students to think that there are three current strategies for helping anyone to think critically and creatively-instruction informal logic, training in focusing attention, and creating a community of inquiry. It concludes that the latter is the preferred mode of teaching thinking for understanding and responsibility, both in schools and in pre-service teaching education. de Bono (1993, p. 54) argues for three levels of practical thinking; casual, discussion and applied.

The teacher is a key in teaching thinking. Based on a synthesis of the education research, the four essential elements that promote thinking in the classroom are proposed by Fogarty and Bellanca (1991) below in Figure 2.3.

Figure 2.3 The Four Elements of the Thinking Environment (Fogarty and Bellance 1991, p. 41)

<p>Climate</p> <p>(Teaching for Thinking) Setting a safe climate for thinking by modeling risk-taking and acceptance.</p>	<p>Explicit Skill</p> <p>(Teaching of Thinking) Teaching the thinking skill explicitly to students and bridging skill application into relevant situations.</p>
<p>Structured Interaction</p> <p>(Teaching with Thinking) Getting kids to process the information together and interact with the material in experiential activities.</p>	<p>Metacognitive Processing</p> <p>(Teaching about Thinking) Getting kids to think about their thinking and deliberately bring their patterns for thinking to conscious level.</p>

a. Creative thinking

Creativity is important for developing students because it enables students to adapt successfully to the drastic changes which are taking place in school, university and wider society. Presseisen (1987, p.30) states that support by teachers and parents is powerful, but the most critical aspect is the child's creative involvement is with the domain itself. Creative thinking strives for insight and the realization of imagination. Wilson and Wing-Jan (1993, p. 134) say '*Creative thinking is associated with imagination and invention. The ability to see things in a new way, flexibility of thought, the generation of new ideas.*' Being creative means combining knowledge and imagination (Ruggiero 1988, p. 70).

Imagination is a big and useful tool. There are four aspects of imagination. They are picture vividness, number of alternatives, different ways of looking at something and creative imagination (de Bono 1983, p. 149). The new creation must be useful to the solution of some problems. Creativity is enhanced by avoiding the temptation for the established answers, searching for alternative answers and designing synthesis of all answers (Passi and Passi 2002 a, p. 3). Woolfolk (1998, p. 132) explains that the teacher

is in an excellent position to encourage or discourage creativity through their acceptance or rejection of the unusual and imaginative. Creativity in the classroom should be the brainstorming strategy, take time and involve play. The role of teacher needs to be as a major player in the students' development as a creator and thinker (McInerney and McInerney 1998, p. 265).

Creative thinking is divergent, generative and productive thinking which leads to a synthesis (Fogarty and Bellanca 1991, p. 6). It is using basic thinking processes to develop or invent novel, aesthetic or constructive ideas (Presseisen 1987, p. 96). Fogarty and Bellanca (1991, p. 9) suggest that an open classroom environment is created and a questioning posture is assumed most effectively through intentional implementation of the instructional strategies of inquiry. The good teacher helps students see relationships that are both new and interesting, valuable, satisfying, relevant, and/or harmonious and encourages them to take intellectual risks and explore unknown possibilities.

Ruggiero (1988, pp. 76-77) explains the creative process as follows:

1. Searching for challenges
2. Expressing the problem or issue
3. Investigating the problem or issue
4. Producing ideas

Quality of thought also improves through learning experience. Students learn by themselves and learn from classroom activities. Ruggiero (1988, p. 72) suggests creative people do not allow their minds to become passive, accepting and unquestioning. Moreover, creative people love to toy with ideas, arranging them in new combinations,

looking at them from different perspectives. Hence, the teacher needs to understand the creative thinking goal, believe in its potential benefits to students and become increasingly reflective about their own practice in order to build the values, skills, knowledge and process of creative thinking into the subjects which they teach. Fogarty and Bellanca (1991) suggest eight ways to foster creativity. They are

1. Encouraging inventiveness
2. Rewarding fresh insights
3. Reinforcing initiative
4. Praising experimentation
5. Listening actively
6. Tolerating failure
7. Encouraging cooperative efforts
8. Providing 'time to create' (p. 10).

Passi and Passi (2002a) suggest guidelines for creativity as follows:

1. Generate many alternatives
2. The more the better
3. Freely associate
4. Combine different ideas and concepts
5. Use parallel analogies
6. Use humor
7. Be child-like
8. Seek novelty but don't forget the obvious
9. Write all ideas down (p. 38).

To promote creative thinking, teachers can apply the skills to the planning of teaching and learning and implement them. Teachers should explore ways of teaching which enhance creative thinking and reflect on their own practice. Lang et al (1995, pp. 233-234) assert that in teaching for creativity, we should...

‘ provide an atmosphere in which students can explore original ideas without fear of criticism or ridicule. Model creative thinking by using divergent questions. Present open-ended challenges across the curriculum and help students to seek different ways of performing tasks, to use divergent idea to solve problems, and to express themselves in an open-ended manner through small group activities.’

Teachers will help students develop self-esteem as they use their imagination and believe that they can become more creative. Using a greater variety of options and transferring students’ knowledge to new contexts leads to developing the creative thinker. Wilks (1995, pp. 50-51) offers a case study of Dino’s year 3. He used an exercise to follow up the question ‘What is a word?’ raised by a student in a previous session. By rarely using responses which are judgmental, such as ‘Very good’ or ‘Right’, the teacher can rather deflect the response to others in the group by asking question like ‘What do other people think?’ Changes in classroom discussion technique help students develop the confidence to contribute without needing affirmation from the teacher.

Project work is another approach to thinking as problem solving and creativity.

Students collaborate in working, planning and implementation. The teacher is a facilitator who will suggest and support the inquiry learning process (Leong 2001).

In some situations creative thinking is integrated within critical thinking. Pamphilon (2000, p. 74) states that *‘Creative thinking is as important as critical thinking. Successful*

critical thinkers not only use rational thinking, they also utilise emotions, feeling and intuition.'

b. Critical thinking

Being a critical thinker is a part of what it means to be a developing person. Critical thinking is necessary to make thoughtful choices, find good solutions to problems and judge ideas. Presseisen (1987, p. 96) states that critical thinking is a basic thinking process used to analyze arguments and generate insight into particular meaning and interpretations and is also known as directed thinking.

Critical comes from the Greek word *kritikos*, which means 'judge' (de Bono 1994, p. 8). Critical also means involving or exercising skilled judgment or observation, and is the general term given to a wide range of cognitive skills and intellectual dispositions needed to effectively identify, analyze and evaluate argument and truth claims, to discover and overcome personal prejudices, to formulate and present convincing reasons in support of conclusions and to make reasonable, intelligent decisions about what to believe and what to do (Bassham, Irwin, Nardone and Wallace 2002, p.1).

Passi and Passi (2002b, p.12) say that critical thinking is the process of purposeful, self-regulatory judgment. It involves consideration of evidence, contexts, conceptualizations, methods, and criteria. Eggen and Kauchak (1996, p. 50) suggest the process of critical thinking includes:

- Confirming conclusions with fact

- Identifying bias, stereotypes, cliches and propaganda
- Identifying unstated assumptions
- Recognizing overgeneralizations and under generalization
- Identifying relevant and irrelevant information.

Woolfolk (1998, p. 319, cited in P. Kneedler 1985) summarizes critical thinking skills. They are defining and clarifying the problem, judging information related to the problem and solving problem/drawing conclusions. Greeno (1989, p. 139) states critical thinking must be to do with whether individuals think reflectively, rather than simply accepting statements and carrying out procedures without significant understanding and evaluation. When we encourage critical thinking, it is important that we assure people, through our actions and our words, that we create a climate in which respect and value them for their own selves. Moreover, it is important to ensure that challenging questions are not posed in threatening ways. Furthermore, we need to attend closely to all these verbal and nonverbal cues (Brookfield 1987, pp.72-73). In the school and university, critical thinking is an essential skill to help students learn how to reason well, when to use reasoning and what reasoning methods to use. Students can learn to think critically or reasonably. Presseisen (1987, p. 30) suggests curriculum in the school should be separated or integrated into content areas in order to teach critical thinking.

There are numerous ways to include critical thinking in the school's program. Use many types of approaches, eg; go slowly; be receptive to questions and to students' original thought; press for clarity; arrange for students to engage challenge each other in discussion; arrange for them to assume progressively greater control over and

responsibility for their learning, encourage students to be aware of what they are doing and review what they have done; ask for a focus and for reasons in any discussion, and encourage students to do likewise.

Brookfield (1987, p. 92) notes that...

‘ The skill of critical questioning is one of the most effective mean through which ingrained assumptions can be externalized. Questioning can be used with individuals and with groups, and it has a long history of application in the qualitative and ethnographic research traditions. Critical questioning-that is, questioning designed to elicit the assumptions underlying our thoughts and actions-is a specific form of questioning. It is concerned not so much with eliciting information as with prompting reflective analysis. ’

The classroom should provide a supportive and nurturing environment which fosters reasoning and critical and creative thinking (Wilks 1995, p. 11). In a critical thinking course, students learn a variety of skills that can greatly improve their classroom performance. These skills include:

- understanding the arguments and view of others
- critically evaluation those arguments and views
- developing and defending one’s own well supported arguments and views.

In addition, critical thinking can help students to critically evaluate what students are learning in class (Bassham et al 2002, p.9). Because critical thinking is valuable in many contexts outside the classroom and the workplace. Students should be trained from

school or university to be critical thinkers. The research has shown that using an instructional model of teaching leads students to improve critical thinking (Gibson 1985; Nekamanurak 1993; Somsak 1997). One of the popular tools for developing critical and creative thinking is de Bono's Six Thinking Hats (de Bono 1987).

c. Six Thinking Hats

The 'Six Thinking Hats' tool is a simple and practical way of organizing and developing skills in thinking. The colour of each hat depicts a specific type of thinking. The Six Thinking Hats provide a tangible way of translating intention into performance. de Bono (1987) defines the meaning of the Six Hats and their roles as follows :

1. The white hat is concerned with facts and figures and with being neutral. It does not offer interpretations or opinions. When wearing the white thinking hat, the thinker should imitate the computer.
2. The red hat is concerned with emotion and aspects of the ideas that are involved with feeling, hunches and intuition. The red hat provides a convenient method for a thinker to switch in and out of the feeling mode in a way that is not possible without such a device. The red hat allows a thinker to explore the feeling of others by asking for a red hat view.
3. The black hat is involved with looking for weaknesses, being gloomy and negative. The black hat thinker points out what is wrong, incorrect and in error. The black hat thinker points out how something does not fit experience or accepted knowledge, why something will not work, risks and dangers, and faults. Black hat thinking can ask negative questions.

4. The yellow hat is involved with strengths, being positive and optimistic thinking. Yellow hat thinking probes and explores for value and benefit, ranges from the logical and practical to the dreams, visions and hopes. Yellow hat thinking is a constructive and generative. It is concerned with making things happen. Effectiveness is the aim of yellow hat constructive thinking.

5. The green hat is involved with creative thinking and new ideas. The green hat searches for alternatives which could be new ideas or old ideas revived. The thinker seeks to move forward from an idea in order to reach a new idea. Provocation is an important part of green hat thinking. It is use to take out of usual patterns of thinking.

6. The blue hat is involved with organization, control and management. It is thinking about the thinking needed to explore the subject. It is like the conductor of the orchestra, Blue hat thinking sets the focus. Moreover, it defines the problems and shapes the questions, determines the thinking tasks, monitors the thinking, provides summaries, overview and conclusion.

In the classroom, the teacher can design the activities for developing thinking process of students by using the Six Thinking Hats method. Asking questions is an approach to learning thinking, as students look at an issue from different ways when learning new ideas. Wilson and Wing-Jan (1993, pp.73-74) suggest 'de Bono's hats' and 'Get a head for the answer' are activities to develop effective questioning and thinking skills. Role playing is used in the classroom too for thinking development. Each student focuses questions and answers by selecting a coloured hat. The students are given an issue/questions to think about from the perspective of each of the hats.

d. Cooperative learning

Cooperative learning helps students learn with and about each other. Each learner has more help than they do in isolated structures. Joyce, Weil and Calhoun (2000) claim cooperative learning is the social model of teaching that is constructed to take advantage of the phenomenon by building learning communities. Eggen and Kauchak (1996, p. 227) have shown cooperative learning is a cluster of instructional strategies that involve students working collaboratively to reach common goals. It evolves an effort to increase student participation, provide students with leadership and group decision making experience. Arends (2001, p.315) says that the cooperative learning model was developed to improve academic achievement, acceptance of diversity and social skill development. The key principles are individual responsibility, which involves commitment to the achievement of a task and accountability to the group (Lang et al 1995, p.357).

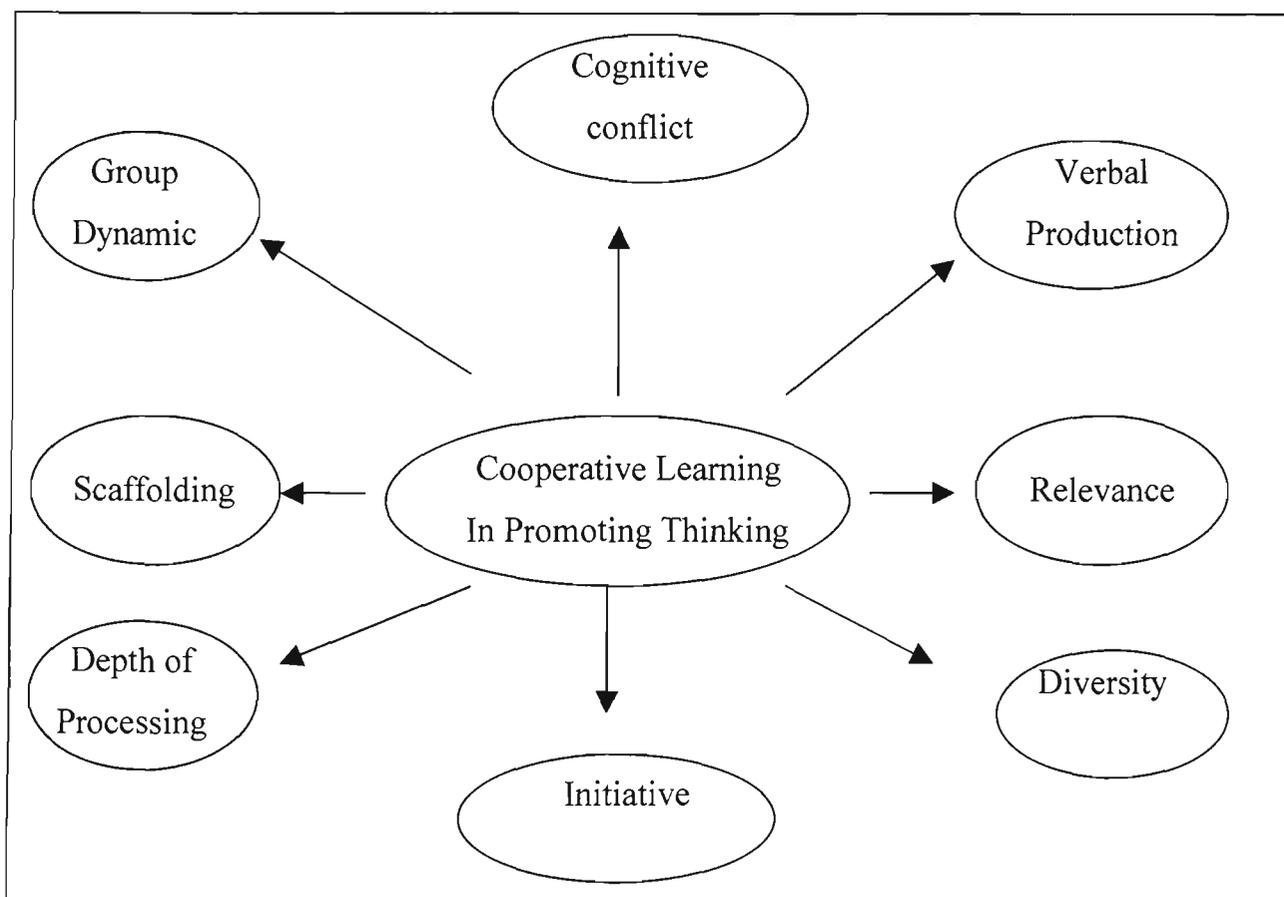
Teachers should use a variety of strategies, including peer tutoring and cooperative games. Johnson, Johnson and Holubec (1992, p.106) state that students must have the prerequisite interpersonal and small group skills and be motivated to use them. These skills need to be taught systematically to inform creative and critical thinking. Graves and Ted (1990) suggest simple structures for introducing co-operative learning. By using these simple structures, teachers can make their ordinary lessons more interactive and help students become used to working together. Simple structures are a good introduction to cooperative learning before trying full blown cooperative lessons, but they will also be used as parts of cooperative lessons. The simple structures are as follow:

- Process partners (Think-Pair-Share)
- Partners interview
- Partners coach
- Partners check
- Partners compare
- Pyramiding (Snowballing)
- Huddle (Heads together)
- Whip
- Partners text comprehension
- Numbered heads together
- Round - robin (Round table)
- Discussion group
- Co-op review

Cooperative learning offers learners the benefits of working together in groups and supporting one another in the interactive process of learning through doing cooperative task (Lang et al 1995, p.346; Bennett, Bennett and Stevahn 1991) and seeking out opportunities to operate jointly with others to achieve mutual goals (Johnson and Johnson 1994, p.12). The learners need to be taught just as systematically as in mathematics and social studies. If the potential of cooperative learning is to be realized, learners must have the prerequisite interpersonal and small group skills and be motivated to use them (Johnson et al 1992,p.106).

Lee, Ng and Jacobs (1998, p.59) examine the research, theory and practice of cooperative learning and its link to the aim of promoting quality thinking in the classroom. They have analysed ten research studies in which cooperative learning was used in conjunction with higher-order thinking tasks or problem solving. Drawing from learning theories of development, cognitive and humanistic psychology, multiple-intelligences and motivation theory, they show how cooperative learning can enhance thinking of students. They conclude that empirical and theoretical support exists for cooperative learning as a viable instructional method for development of quality thinking. Moreover, Lee et al (1998) assert that cooperative learning can support an environment in which students feel encouraged to take part in higher order thinking. Some of the key concept of cooperative learning in promoting thinking are shown in figure 2.4.

Figure 2.4 Key Concepts Linking Cooperative Learning and Thinking (Lee et al 1998, p.69)



8. Higher order thinking

The definition of higher order thinking skills itself depends on an understanding of the notion of 'higher order' of 'thinking' and of 'skills' (Slade 1995, p. 38). Slade states that higher order thinking skills are meta-level skills which involve reflection upon skills of a lower level. They involve thinking about the thinking process itself, justifying and questioning. Arends (2001, p. 350) explains higher order thinking, unlike more concrete behaviors, is complex and not easily reduced to fixed routines.

Eggen and Kauchak (1996, p. 350) say higher order thinking is a mean of process of forming conclusion based on evidence. Thomas and Albee (1998, p. 1) assert that it essentially means thinking that takes place in the higher levels of the hierarchy of cognitive processing. Bloom's Taxonomy is the most widely accepted hierarchical arrangement of this sort in education and it can be viewed as a continuum of thinking skills starting with knowledge level thinking and moving eventually to evaluation level of thinking.

The Office of the National Education Commission researchers conclude that higher order thinking skills concern critical thinking, creative thinking, metacognition, problem solving, decision making, intuitive thinking and positive thinking (Office of the National Education Commission 2001, p. 25). For them, higher order thinking consists of levels of thinking, learning to adapt and apply and implement, then reflection to do better. The higher order aspect of evaluation involves good judgment of alternatives.

Higher order thinking is very powerful: it supports higher learning in each discipline. Its skills interweave practical and theoretical knowledge and consist both in the ability to think well and the ability to recognise and evaluate good thinking. In classroom activities, Snowman and Biehler (2000, p. 349) suggest that using active learning, Socratic questioning and reflection activities can promote higher order thinking. Office of the National Education Commission (2001) research has shown that creative and critical thinking of talented children can be developed by specially chosen materials, strategies and exercises which must be appropriate and challenging. Taking time is very important for learning because development of higher order thinking needs to occur over the longer term.

An example model of teaching to develop higher order thinking is found in Wei (1996). He reports in research that self-study can help students develop their learning skills and build a learning framework. When students become active learners, they will find learning pleasurable and learn actively in their life-span and develop their high-order thinking skills. Slade (1995, p. 45) states the notion of higher order thinking skills that emerges from conception is not specific to one gender, class or ethnic group. Listening, making decisions and appropriate responses or asking for justification are all processes which can be achieved through different conversational styles, whether male or female. It is characterised, however, by the ability and willingness to ask and press certain sorts of questions, to justify practices and to have others justify theirs. It is also characterised by cooperation and respect for others. However, the teaching of higher order thinking skills can only be achieved through dialogue.

There is difficulty in assessing higher order thinking skills conceived in terms of justifying reflectively or questioning thinking in a discipline (Slade 1995, p. 39).

Ormrod (1998, p. 366) suggests teachers use assessment techniques that emphasize students' knowledge of facts. Students will naturally begin to believe that school learning is a process of absorbing information in a rote, meaningless fashion and then regurgitating it later on. In contrast, we focus class time on processing information, on understanding, organizing, elaborating, applying, analyzing and evaluation. We can also assess students' ability to transform classroom material, rather than simply to repeat it in its original form so our students must begin to develop learning and memory strategies that will serve them well in the world beyond the classroom in the New Economy.

9. Strategies to develop reflective and metacognition thinking

Reflective and metacognitive thinking is a natural part of teaching and learning.

Teachers should reflect on own their teaching and learning. They must be able to set the strategies for reflecting with their students. Reflection is central to learning for both teachers and students, as both are learners. Furthermore, as reflective thinking strategies are valued and practised, students' metacognitive abilities improve (Wilson and Wing-Jan 1993, p. 2), Biggs and Moore (1993, p. 308) argue that reflection supports and describes metacognition very well; reflection transforms error from a disaster into a positive learning experience. Metacognition simply means that we reflect, critically and realistically, on what we are doing; it helps us cope with new and complex situations of all kinds. Johnson (1999, p. 347) defines metacognition as a process of reflecting upon and analyzing what and how one thinks, feels and learns in order to learn better.

Ormrod (1998, pp. 348-349) has shown that metacognition includes all of these things:

- *Knowing the limits of one's own learning and memory capabilities*
- *Knowing what learning tasks one can realistically accomplish within a certain amount of time*
- *Knowing which learning strategies are effective and which are not*
- *Planning an approach to a learning task that is likely to be successful*
- *Using effective learning strategies to process and learn new material*
- *Monitoring one's own knowledge and comprehension in other words, knowing when information has been successfully learned and when it has not*
- *Using reflective strategies for retrieval of previously stored information.*

Woolfolk (1998, p. 267, p. 282) suggests that there are three essential skills of metacognition. They are planning, monitoring and evaluation. These are powerful executive controls in the information processing system. Metacognition involves an awareness of what thinking strategies to use and helps understanding of when, how and why differences in metacognitive abilities seem apparent. As children grow older they are more developmentally able to monitor and direct their attention and learning strategies. Explicit teaching can enhance metacognitive skills to help students become strategies learners.

Wilson and Wing-Jan identify strategies that can be used to develop reflective and metacognitive thinking, including :

- learning logs
- concept mapping

- questioning
- self-questioning
- negotiating learning
- self-assessment (1993, p. 52).

Developing strategies in reflective and metacognitive thinking greatly enhances students' abilities to take responsibility for their own learning. The teacher can use the strategies to apply in classroom teaching of many curriculum areas and grade levels. Furthermore, McNerney and McNerney (1998, p. 98) suggest some techniques to encourage the development of metacognitive skills. They are encouraging students to ask question about process, reflecting on their learning, problem solving by thinking aloud, being flexible in their approach to learning, developing learning plans and learning to summarize. Wilson and Wing-Jan state that reflective and metacognitive skills will be developed within a supportive environment, a regular time commitment, working with peers can enhance motivation, the context of meaningful content, the relationship and power sharing between teachers and students, co-operative group skills and assessment procedures. There are two factors that affect reflective and metacognitive growth. They are external and internal factors. The external factors concern curriculum arrangements and the learning experience. The internal factors concern cognitive factors, attitudes and personality/behavioral competencies. The teachers need to trust children to take responsibility and feel confident their own learning in order for development of reflective and metacognitive thinking skill awareness and control (1993, p.4, pp.129-130).

Teachers' pedagogical responsibility is to develop a classroom environment and planning program for learning and to enable students to reflect on their own work. The use of the

strategies to develop reflective and metacognition thinking has benefits for teachers and students. It can assist learners to learn more effectively if it is focused on affect feelings and emotions as well as cognition (Johnson 1999, p. 347). Research by Johnson to investigate metacognition, affective response and values in teachers' development shows that educating teachers to use the affective as a focus for reflection with their students appears to have a strong potential for helping teachers themselves to become more metacognitive about their own development.

Finally, in values education, it is highly desirable that teachers continue to question their own values and the way their own values are effecting their teaching (Johnson 1999, p. 358). Effective metacognition would attribute causes to something over which learners have control, such as increased effort or gaining the right strategy (Bigg and Moore 1993, p. 308).

In addition, Bigg and Moore explain that choosing the approach carefully to support learning is critical. Teachers need to realize that there is no one way in which students go about their learning; that some ways are more effective than others; and that, most importantly, there are things they as teachers can do to optimize the chances for students to go about learning in the most desirable way (1993, p. 310).

Reflective thinking and metacognition improve students' learning. The students' awareness of metacognitive processes promote more effective learning. McNerney and McNerney (1998 cited in Bakopanus and White 1990, p. 99) states Australian studies using the Project for the Enhancement of Effective Learning (PEEL) show that

metacognitive training improves students learning. Wilson and Wing-Jan (1993, p. 3) assert metacognitive thinking supports effective learners who are able to make decisions, choose appropriate strategies, self-assess and set their own goals. Metacognitive thinkers are aware of their thinking and are able to control their thinking strategies. Using learning logs, concept mapping, questioning, self-questioning, negotiating learning and self-assessment are major strategies for developing reflective and metacognitive thinking. The decision about learning what and how to learn best is made by students. The challenge for teachers is to enhance and promote students who want to learn and to think effectively.

10. Questioning and answering

Based on teacher-effectiveness research, essential teaching skills which specify the abilities that all teachers should possess, have been identified (Eggen and Kauchak 1996, p.55). The expert teachers go beyond essential teaching skills to promote higher-order and critical thinking in their students. Teaching for good thinking and deep understanding of content cannot be separated, and expert teachers simultaneously teach both. Similarly, Young (1998) notes reforms in teacher education require rethinking in terms of how students learn to become a teacher. To achieve this student teachers need to be educated in the teaching of thinking skills so that they may stimulate a more thoughtful society (Cherednichenko 2000).

The questioning and answering skills of students reflect how they think, what they learn and what they know. An effective teacher has to set up good questions. The conceptual

basis for Chandhaket's (1983) research was that teachers' questions could trigger children's cognitive thinking and, hence, their processing skills could be developed. Mousley and Sullivan (1996, p.113) assert that quality of the classroom is identified through questions that can engage the students in creative and active thinking and provide opportunities for communicating about their learning.

Eggen and Kauchak (1996, p. 40) identify questioning as one of the most important skills in effective teaching. Through questioning a teacher can help students form relationships, ensure success, involve reluctant students, induce the involvement of an inattentive student, and enhance students' self-esteem. Moreover, questioning also helps students maintain sensory focus, provides communication of important concepts via repetition, and is able to informally assess student understanding.

Essential teaching skills are analogous to basic skills and can be described as the critical teacher attitudes, skills and strategies necessary to promote student learning. Dewey (1993, p.266) noted, *'What's in a question, you ask: everything. It is the way of invoking stimulating responses or stultifying inquiries. It is, in essence, the very core of teaching.'*

Lang et al (1995, p.154) poses productive questions and handling students' questions and responses as an important part of every teacher's day. Effective questioning involves a step- by- step process.

Questioning skill is difficult to develop because it involves several things at once: remembering the goals of the lesson and monitoring students' verbal and nonverbal behaviors as well as memory. Such skills are introduced through questions with 'why' and 'how' rather than stopping at 'what, where and when.' Building the form of questions from simpler to higher order questions and the use of convergent questions, divergent questions and evaluative questions (Lang et al 1995, p.158) also provides a scaffold or framework of support for the development of deep inquiry and thinking in students, student teachers and teachers.

Moore (1998, p.258) developed Mental Operation Questions based on Guildford' s Structure of the Intellect model and Bloom's Taxonomy. The Mental Operation system is basically a four-category system that combines four of Bloom's categories into two categories. It is shown in Figure 2.5.

Figure 2.5 Categories of Questions (Moore, 1998, p.259)

Mental Operation Questions	Bloom's Taxonomy	Guildford's Structure of the Intellect
1. Factual	Knowledge/comprehension	Cognitive or memory process
2. Empirical	Application or analysis	Convergent thinking
3. Productive	Synthesis	Divergent thinking
4. Evaluation	Evaluation	Evaluation

There are specific types of questions for different purposes. These are closed questions, opened questions and rhetorical questions. The questions can be used as directed questions, group questions and student-initiated questions (Wilson and Wing-Jan 1993, pp.67-68). Effective teachers must also ask the right questions; that is, they need to adapt

the type of question to lesson objectives. Moreover, teachers need to plan activities to develop effective questioning.

In classroom circumstances, the practice of questioning describes the use of student and teacher questions during recitation and discussion (Dillon 1988, p.1). The questions that require the student to bring concepts together to get a 'right' answer or perhaps challenge the perceived 'right' answer, lead students to a new perspective, help them to synthesize or be creative and make carefully considered and clearly substantiated judgments.

Hence, teaching and training students for questioning, framing question and answering is essential as foundation knowledge for teachers. With practice, however, teachers can become skilled in questioning, and this skill is highly developed in expert teachers (Eggen and Kauchak 1996, p. 40). Cole and Chan (1987, pp. 121-122) suggests that to enhance effective questioning in the classroom, competent teachers employ a variety of techniques to assist students to find answers to questions and to promote students participation in class discussion. The teacher should assist students to define an appropriate response. The teacher's role in questioning should be helpful and supportive and not negatively critical or evaluation.

11. Good questions

Educators advocate using questions for a variety of proposes (Wilén 1991, p. 9). Cole and Chan (1987, p. 115) suggest purposes of questioning as follows:

- Questions facilitate communication
- Questions focus attention on particular aspect or features of a topic

- Questions are used to evaluate students' knowledge and understanding of subject matter
- Questions help to review essential content in a subject
- Questions stimulate particular kinds of thinking and cognitive activity
- Questions can be used to control the social behavior of students.

The teacher should consider a major purpose of their questions to be stimulation of students' higher-level-thinking. It is important to allow some 'wait time' to give students time to think when responding and encourage higher-level-thinking. Students think critically particularly when they are pushed to clarify, explain, and support their responses (Wilén 1991, p. 10).

Before asking questions, teachers are advised to prepare the questions to ask. This preparation involves teachers consciously wondering about the purpose of the work and questions (Dillon 1988, p. 98). So teachers need to understand their context and goal for teaching and learning. Dillon (1988, p. 101, 103) explains that after asking the question, teachers need to listen to the answers. Taking the time and care to listen are essential things to do to promote inquiry learning. Moreover, in good questioning, it is important to be 'nice' and to be 'slow' when asking questions. 'Nice' concerns the respectful tone and attitude of the questions. 'Slow' refers to frequency and pace of questions that lead students to say what they know.

Teachers can be educated to improve questioning practices by raising the cognitive emphasis of their questions and using a variety of questioning techniques. Questioning is not the simplistic, intuitively based practice that unformed persons commonly assume; it

is a complex and dynamic aspect of interpersonal communication. The quest for the perfect questioning techniques or strategy may never be fulfilled, but its pursuit is a worthwhile endeavor for every teacher (Wilén 1991, p. 33).

Wilén concludes that effective teachers engage in the good questioning practices, phrase questions clearly, allow three to five seconds of wait time after asking a question before requesting a student's response when high-cognitive-level questions are asked, encourage students to respond in some way to each question asked and balance responses from volunteering and non-volunteering students (1991, p. 23). Moreover, Margan and Saxton (1991, p. 7) state effective questions generate students' thought and interest in constructing answers. The classroom then becomes an exchange of the expression of ideas, and teachers will have to adjust their teaching style, their subject coverage, expectations, their assessment techniques and the way in which they go about planning.

Wilson and Wing-Jan (1993, p. 67) suggest that a good question is one that:

- *Contributes to learning*
- *Sparks further questions and interest in seeking answers*
- *Involves critical and creative thinking*
- *Goes beyond recall of basic information*
- *Provides challenge but is not too threatening*
- *Is appropriate to the learning situation and student*
- *Builds on prior knowledge and makes connections*
- *Involves students in reflection and / or planning*.

Margan and Saxton (1991, p. 6) argue that good questioning must be presented in such a way that it connects with the students at both an intellectual and a feeling level. Teachers can teach until they are 'blue in the face' but learners will not learn what we teach unless they want to learn. Students learn best in a positive environment.

12. Classroom environment

The primary role of teachers is to help facilitate natural-growth motivation in students (Tauber 1995, p. 27). Motivation should be the purpose underlying every aspect of lesson planning and delivery, a positive classroom climate, efficient classroom management and good teacher-student rapport. These are essential for effective motivation and maintain interest (Lang et al 1995, p. 80).

Today's classrooms are places where the teacher serves as a highly knowledgeable guide who leads students to sources of factual information, but who also encourages shared problem solving and reasoning through talk and group work. Students are encouraged to express opinions, clarify values and critically think through problems (McInerney and McInerney 1998, p. 208). The classroom is a place to encourage good behavior and discipline. The goal is to establish classroom that is warm and natural. Charles, Senter and Blaine Barr (1996) suggest tactics for establishing classroom discipline. There are three broad categories referred to as (1) the person component (2) the management component and (3) the teacher component.

The *person component* has to do with students and how they are treated so that they feel secure. Examples of the person component within the classroom are as follows:

- Strengthening student self-concept by giving each student regular personal attention, making sure that each student experiences success in learning and helping students receive recognition for their accomplishment
- Clear goals as targets
- Ensuring genuine success
- Curriculum for competence
- Effective instructional materials
- A sense of togetherness
- Purpose in class activities
- Share in the classroom (Charles et al 1996).

The *management component* involves the treatment of students and the organization, delivery and monitoring of instructional programs. It is important to manage a good classroom climate so that it is friendly, supportive and pleasant, helpful and non-threatening. In addition, good human relations skills improve the quality of classroom.

The *teacher component* of classroom management focuses on well-liked teachers, efficient teachers and expert teachers. The expert teachers display the best qualities. They care about students and do what they can to make learning interesting, exciting, and satisfying. Their students learn well, admire and respect them, and usually like them personally.

Tauber (1995, p. 28) explains Skinner and Rogers' model of classroom management. Skinner emphasized a behaviorist framework, and Rogers emphasized a humanist framework. The details are shown in Figure 2.6.

Figure 2.6 Skinner Versus Rogers 'Representative Terminology' (Tauber 1995, p. 28)

<i>Skinner</i>	<i>Rogers</i>
Authority figure	Knowledgeable leader
Control	Influence
Pressure	Stimulation
Demanding	Winning cooperation
Praise	Encouragement
Domination	Guidance
Win-lose	Win-Win
External discipline	Self-discipline
Man's action	Man's self-awareness
Predictable	Unpredictable
Objective world	Subjective world
Public world	Private world
Freedom : An illusion	Freedom : A reality
Behaviorism	Humanism
External frame of reference	Internal frame of reference
Lack of trust	Trust
Manipulator	Facilitator
Environment contingencies	Actualization
Control and / or be controlled	Free will

Purdie and Smith (1999) reflect with a preservice teacher after a teaching practicum. They show that a 'humanistic' approach to teaching encourages a warm supportive relationship between teacher and student, and this atmosphere, is more likely to yield productive outcomes.

Langer (1992, p. 17) says that thoughtful classrooms look different from traditional classrooms. In traditional classrooms, the teacher does most of the talking, conveying

information from a position of authority and control. In thinking classrooms, the teacher facilitates and encourages students to challenge ponder and take risks. Activities range from large-group, small-group and teacher-directed discussion to cooperative learning group. Tishman, Perkins and Jay (1995, pp. 11-12) suggest a language of thinking vocabulary that teachers should use to enrich the discourse of the classroom. The following are typical vocabulary which can be encouraged as part of the language of thinking in the classroom.

advance	affirm	analyze	assert	assess
believe	cognize	comprehend	consider	criticize
decide	define	deny	discriminate	establish
estimate	evidence	examine	explain	explore
glean	infer	inquire	interpret	judge
justify	know	maintain	observe	process
propose	prove	question	realize	reason
recognize	reflect	remember	research	resolve
review	solve	state	study	submit
suggest	suppose	survey	think	theorize

Understanding, applying and developing with students a language of thinking helps teachers manage classroom learning and use words in instruction. Further, when students write, talk and discuss the details, this should reflect the situation in the classroom.

Students learn best in a climate in which the atmosphere nurtures their bodies, minds and spirits (Wilson and Wing-Jan 1993; p. 19). A positive learning climate needs to ensure that the classroom is safe, orderly harmonious, and friendly. Lang et al (1995, p. 84) suggest that teacher can accomplish by:

- *modeling positive and constructive attitudes and behaviors to colleagues,*

students, and parents

- *exercising authority fairly*
- *offering warmth and support*
- *encouraging independent thought or cooperation, as appropriate*
- *motivating students to learn, and allowing them a measure of choice in the learning process*
- *ensuring a reasonable balance between positive and negative feedback*
- *seeking opportunities to make students feel liked, included, supported, accepted, valued, successful, special, and emotionally secure.*

A successful teacher must be a good classroom manager. The key to effective management is the relationship the teacher establishes with students and promotion of democratic practice (Moore 1998, p. 331). Lang et al (1995, p. 102) state that

‘...Effective classroom management, which begins with efficient lesson planning and preparation, help free teachers to teach and students to learn. Students thrive in a positive, personalized, and supportive classroom climate and an environment in which they feel safe, cared for, and involve.’

This means a classroom atmosphere in which students perceive their teachers as cooperative and as inquiring active learners will be most effective (Brekelmans, Slegers and Fraser 2000, p. 239).

13. Action learning

McGill and Beaty (1995) state that...

‘Action learning is a continuous process of learning and reflection, supported by colleagues, with an intention of getting things done. It involves a group of people

(a set) working together for a concentrated period of time. The focus, however, is on the individual who comes to the set to learn from experience and to move on to more effective action. The set assists the individual to learn by challenging assumptions and supporting thinking through alternative courses of action. Action learning aims to empower people.'

Inglis (1994, p. 3) explains action learning is a way to find solutions to problems and develops both the individual and organization. There are two aspects of action learning:

1. Growth and development of people and of the organization
2. The simultaneous finding of solutions to problems

Brockbank and McGill (1998, p. 221) assert action learning sets are a particular stylized form of group based learning leading to an exploration of issues that are personally relevant to them and that relate to affective and cognitive levels, that is at the level of thinking, feeling and doing. Action learning is the cycle of experiential learning. The cycle involves experience, understanding, planning and action in a situation. Experience leads to observing and reflection of action. Understanding involves forming or reforming understanding of a situation as a result of experience. Planning involves attempting to influence the situation based on newly formed or reformed understanding. Finally, action learning involves trying out the plan in the situation (McGill and Beaty 1995).

Knowing how we learn from experience, we should be able to become proactive and plan to learn from experience. Kolb (1984, p. 38) develops a theory to explain the nature of

experiential learning. He explains critical aspects of the learning process as viewed from the experiential perspective. These are as following:

- 1. The emphasis on the process of adaptation and learning as opposed to content or outcome*
- 2. Knowledge is a transformation process, being continuously created and recreated, not an independent entity to be acquired or transmitted*
- 3. Learning transforms experience in both its objective and subjective forms*
- 4. Understand learning, we must understand the nature of knowledge, and vice versa.'*

Inglis (1994, p. 14) mentions the Kolb's learning cycle which was further developed by Peter Honey and Alan Mumford (Inglis 1994, pp. 15-16) recognized that each one of us has four channels through which we learn, although as individuals we prefer some channels to others. These channels are called learning styles, and are named activist, reflector, theorist and pragmatist.

Understanding the experiential perspective and learning styles guides facilitators to create a learning and developmental climate for the set as a whole. Brockbank and McGill (1998, p. 218) suggest action learning is set in the workplace by

- *Individuals meeting together in a group*
- *Each individual other than the facilitator bring a real issue/problem or project to the set that they wish to progress*
- *The whole set works on the issue for the benefit of the person presenting the issue*

- *The aim for each individual presenting their issue is to be able to take action on some aspect of the issue, to reflect upon and learn from the action as the issue is progressed*
- *Typically, the action learning set meets for three to four hours to six weeks for a cycle of meeting over an agreed period.*
- *The set will create explicit conditions, 'ground rules' on which to operate to ensure effective working.*

Reeve (1999, p.71, p. 73) suggests linking action learning and capability of learners involves the nature of learning, learning to learn, a future orientation, abilities to cope with new and desire to engage with 'work' in both an intellectual and practical. Teachers must promote students in the journey toward intrinsic approaches, deep learning and holistic perspectives. Reeve considers successful action learning includes:

- andragogical approach
- respect
- control shift
- encouragement of co-operative and cohesive attitudes
- trust
- confidentiality
- engagement intellectual and emotional level
- the cycles of learning and reflection.

In higher education, learning centered on the learner and the increased use of experiential learning approaches and ideas about reflective practice have made action learning

increasingly appropriate in this setting (Brockbank and McGill 1998, p. 218). Teachers in higher education are often necessarily engaged in their continuing professional development. It is the learning process through action and the ongoing process of developing skills, knowledge and feeling. Brockbank and McGill conclude that *'action learning sets can become an important part of the repertoire of approaches to reflective dialogue that promotes critically reflective learning. Sets create the conditions for integrating, knowledge, self and action in the world'* (1998,p.230).

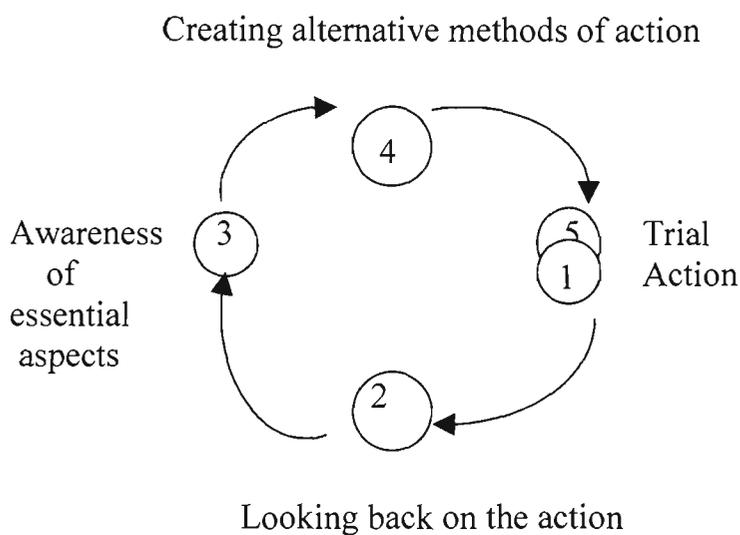
14. Reflecting, teaching, learning

A successful teacher is a result of three stages of professional development. First, the teacher masters the basic instructional techniques such as asking questions and giving direction, providing daily teaching and taking routine action. Second, the teacher will master effective decision making, a skill that allow to evaluate taking action. Finally, the teacher will practise critical reflection. The goal of reflective practise is to help the teacher become a self-analyzing, self-actualizing teacher and decision maker by developing a lifelong habit of systematic reflection (Lang et al 1995, p. 11).

Schön (1983) contributes to the idea of reflective practice as a means of enhancing a learner's critical and reflective abilities. Brockbank and McGill (1998, p. 72) assert meaning for reflective practice as reflection-on-action and reflection-in-action. An important element of reflection is the relationship between time, experience, and expectations of learning through reflection (Loughran 2002, p. 33). Korthagen, Klaassen and Russell (2000, p. 247) suggest fundamental to conceptualization of the process of

reflection is the close relationship between teachers' actions, their perceptions of the actions, and the possibility of reforming the perceptions. They design the reflection process as a spiral. The model is called the ALACT model (see Figure 2.7).

Figure 2.7 The ALACT Model for Reflection (Korthagen, Klaassen and Russell 2000, p. 248)



Teachers are not only stimulated to reflect, but also they learn to master the process of reflection itself. Loughran (2002, p. 33) states that it leads to valuable learning outcomes for teacher educators and their students and so it must be effective reflective practice. Moreover, Brockbank and McGill (1998, p. 73) say that reflective practice is a core attribute of critically reflective learning in their own works. As a teacher, through reflective practice it engages students learning course and relates them about how they are learning about their learning. Reflection is the process whereby experience becomes learning. McGill and Beaty (1995, p. 2) show that learners can only learn themselves and only they can reflect their experience. Reflective practice concerns to the growth of profession.

Pasner (2000, p. 21) shows that 'Experience + Reflection = Growth'. There is now much written about the teacher as the researcher. He or she alone has full access to what happens in the classroom. Teachers need to be trained to reflect systematically upon practice, to subject such reflections to critical scrutiny, to hypothesis and to test out the hypotheses against relevant experience. The teacher can be assisted in getting to a deeper understanding both of the situation in which he or she is teaching and of the particular episodes which occur in the classroom (Pring 1999, p. 6). Fedele (1996) argues for reflection on classroom teaching through action research. Fedele has always spent time reflecting on teaching. It is useful as a way of deciding how to proceed based on past events, thinking of solutions to problems and sparking new ideas. His research shows teachers' inquiry into teaching through collecting experiences on audio tapes, videotapes, transcripts, think book and self-evaluation. Students have also engaged in the process of group oral reflection. Through these experiences it becomes clear that reflection is a critical aspect of learning and consequently necessary for better teaching. It takes time to reflect, a focus, a feeling of safety, an expectation to reflect. Fedele says that '*My research into the value of reflection has helped me develop a strong belief that reflection is a necessary and powerful component of learning.*'

Mehlinger (1999) reflects on forty-four years of teaching, and shares his two major concerns as a teacher at various levels of education. He was concerned about whether he knew enough about the subject, world history, which he taught, as well as whether his students were learning what they needed to know. He understands much better now than at the start of his career as a teacher forty-four years ago. He shall continue to learn on his own and by depending upon others, including students. He has learned being

a teacher is not possessing a body of knowledge that is passed authoritatively to others; being a teacher is being a learner and helping others to learn effectively.

Reflection on learning is a valuable pedagogical aid and an essential component of both study and practice in the work situation (O'Reilly, Cunningham and Lester 1999, p. 29).

In addition, reflective practice which leads to self-directed learning deliberation about the goals and values of practice already engaged in, naturalistic enquiry, narrative a story as it is felt and seen by the practitioners themselves (Pring 1999, p. 6). Professional development partly as an emancipation of practice by learning through practices, reflection is indeed at the heart of the matter and equally valuable regardless of the profession (Loughran 2002, p. 34).

15. Self and group assessment

Marsh (2001, p. 194) defines assessment as the term typically used to describe the activities undertaken by a teacher to obtain information about the knowledge, skills and attitudes of students. Wilson and Wing Jan (1993, p. 110) define 'assessment' as given to the process of collecting and analyzing information about performance. The purposes are to provide feedback to students, parents and teachers, to assist student learning and to inform teacher planning. Marsh (2001, p. 194) states that assessment practices are used for different purposes, such as monitoring progress, grading students, predicting future achievement, motivating students and diagnosis of teaching. Moreover, Hildebrand, Morris and Fitz-Gibbon (2000, p. 8) assert that some reasons for assessment students' learning are diagnosing strengths, skills of prior learning, providing feedback on progress

or performance to students during a segment or work (formative), and determining levels of performance or achievement at the end of course (summative).

Self and group assessment require students to examine their own and peers' behavior, work and progress. They provide information with which to establish goals, and creates commitment to improving individual learning (Wilson and Wing Jan 1993, p. 113).

Self-assessment and peer-assessment are assessing skills competence and be important aspects of many assessment tasks (Marsh 2001, p. 201).

The strategies listed below can be used for both self and group assessment. These strategies were suggested by Wilson and Wing-Jan (1993, pp.114-133); Carnegie (1992, pp. 129-130); Marsh (2001, p. 197) and Lazear (1995) are illustrated in Figure 2.8.

Figure 2.8 Strategies for Self and Group Assessment

<i>Self – assessment</i>	<i>Group – assessment</i>
<ul style="list-style-type: none"> • learning log and journal • form evaluating yourself • observation form • tape recording • video recording and photography • questioning / answering • self-questioning • decision-making • goal-setting • concept mapping • demonstrating • oral reflections about learning and thinking • action planning 	<ul style="list-style-type: none"> • sharing and feedback • form evaluating • observation form • tape recording • video recording and photography • group work • concept mapping • action planning • group interview • round robin • think-pair-share • group jigsaws • peer coaching

<ul style="list-style-type: none"> • interview • rating scales • checklists • essay tests 	
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Self and group assessment are techniques to enhance the development of reflective and metacognitive thinking. Self and group assessment provide valuable insight for teachers about the way students learn and think. They help teachers to monitor changes in reflective and metacognitive thinking .

16. Teacher attitudes

Feldman (1998, p. 33) constructs attitudes as evaluations, attitudes as memories.

Attitudes have a critical psychological functions including knowledge functions and self functions (p. 343). Baron and Byrne (2000, p. 125) explain attitudes as evaluations of any aspects of the social world and are often acquired from other persons through social learning. Lord (1997, p. 222) says that attitude have three components: positive or negative thought, feelings, and actions. Myers (1997, p. 131) states that attitudes and actions feed each other.

The relationship between attitudes and behavior depends on several factors. They are the degree of correspondence between attitude and behavior, the relevance of an attitude to a behavior, and the strength, importance, and stability of an attitude and the situation (Feldman 1998, p. 358). Attitudes serve five functions; understanding events, expressing values, protecting self-esteem, maximizing reward, and matching social situation (Lord 1997, p. 234).

Attitude measurement techniques include direct and indirect, or cover, procedures (Feldman 1998, p. 343). Lord (1997, p. 216) suggests a person's attitude can be measured directly by asking questions about thought, feeling, and likely actions toward the attitude object. Henderson, Morris and Fitz-Gibbon (1987, p. 20) assert four approaches for evaluating the attitudes. These are:

1. Self-report measure (Members of group report directly about their own attitudes)
 - interview, surveys, polls
 - questionnaires and attitude rating scales
 - log, journals, diaries
2. Reports of other (Other report about the attitudes of members of group)
 - interview
 - questionnaires
 - log, journals, reports
 - observation procedure
3. Sociometric procedures (Member of group report about their attitudes toward one another)
 - peer ratings
 - social choice techniques
4. Records
 - counselor files
 - attendance records

Henderson et al (1987, p.12) found that the measure of attitude toward school or work is complex. It has many facets, feelings, and beliefs about one's teachers or supervisors, classmates or co-workers, school subjects or job and activities.

Teacher attitudes can include internal and external factors leading teachers to positive and negative thought. The internal factor is self-awareness of teachers. Lang et al (1995, p. 5) say that becoming a teacher is expanding self-knowledge (getting to know more about yourself) through constructive self-analysis. Teachers should learn more about several aspects of their mental and emotional life. They are personal motivation, personal beliefs and values, personal needs and feeling, the power of personal modeling, personal ethics and limits of personal responsibility. The external factors influencing teacher attitudes are policy, organization, principal, community, parents, students, colleagues and social issues. The principal should provide and support teachers to link internal an external each other. Positive and negative thought, feeling and action of teacher are considered from some research.

Reid's (1997) study was an action research project of reflective practice. Implementation of action research helped Reid learn so much more about teaching. For example, learning to be good at teaching is whatever helps people to get good at learning. Good learning is immediate. It is fun and enables teachers to become more powerful. Reid's attitude is positive for teaching and learning and to be good teacher. Wilson (2002) says that being a teacher-researcher though 'Open Learning' has made him begin to wonder about the nature of work and how this differs from the knowledge generation in traditional

research. Reflective process shows that it makes him a better teacher and becomes more rewarding and more enjoyable.

A part of research of Joffres and Haughey (2001) shows that low feelings of efficacy and low feelings of community are the direct determinants of the informants' declining commitments of teachers. Low feelings of efficacy and community are fostered by diverse organizations (e.g., lack of collaboration) and individual characteristics (e.g., the participants' beliefs in specific values and goals).

Consider, for example, research steers the awareness of feeling, thinking and action of teachers. Reflective practice enhances teachers' understanding of their role and professional development. Teachers should be happy in teaching and find a positive way to reflect and evaluate themselves. Support systems, setting learning organization, staff development and collaborative learning are very important in influencing teacher attitudes.

17. Teacher professional development

According to Elliott (1991, p. 121) a competence is a description of something which a person who works in a given occupational area should be able to do. It is a description of an action, behavior or outcome which the person should be able to demonstrate. An element of competence describes what can be done; an action, behavior or outcome which a person should be able to demonstrate. An element of competence may describe such things as the knowledge or understanding which is essential if performance is to be sustained, or extended to new situations within the occupation. In addition, the Asia-

Pacific Center of Educational Innovation for development (1996, p. 24) suggest areas of teacher competence as follows:

Figure 2.9 Areas of Teaching Competence

AREAS OF TEACHING COMPETENCE		
1	Teaching, what for?	Education objectives and goals
2	Who to teach?	Getting to know the students and their environment
3	Where to teach?	The school institution, the classroom, the teaching learning environment.
4	What to teach?	Curriculum content: knowledge, skills, values and attitudes
5	How to teach?	Pedagogical competencies in general, and for each subject or area in particular
6	With what to teach?	Means and materials for teaching.
7	How to evaluate?	Competencies to evaluate both teaching and learning
8	How to improve teaching and learning?	Competencies to continuously improve practice (observation, self-reflection, self-study, research systematization, exchange, collective work)

This paradigm needs to take into account issues for leading professional development. The teachers can see the way they want to go and they are able to choose. The professional development that the system provides is not specific enough for the individual classroom teachers. An important issue for teachers in the new classroom culture of the New Economy is that they have developed the children as a model learner. Moreover, it is important that teachers be learners. Stringer (1999, p. 184) believes that

the teaching profession must speak out about what we know about learning teaching. Calderhead and Shorrock (1997, p. 195) state that learning to teach involves more than the mastery of a limited set of competencies. It is a complex process and can facilitate the professional development of teachers.

Professional development (PD) is defined as the development, self-development and institutional management of faculty and staff (Zuber-Skerritt 1992b, p. 145). Dean (1991, p. 7) defines professional development as career long, starting with initial training and continuing until retirement. It is an active process. Teachers must actually and actively work to develop themselves.

Zuber-Skerritt (1992b, pp. 164-165) differentiates four main models of professional development, depending on the type of work undertaken, its focus and the role of the unit staff. These models are as follows:

1. There is the professional service model, in which practitioners' specialist service can be utilised for solving an identified problem.
2. The counseling model is adopted by staff, who see their role as providing assistance to students and teachers with solving their learning/teaching problems.
3. The collegial model is adopted by unit staff who work in close collaboration with teaching staff such as an action research project. This model is best appreciated by academics, but is only appropriate and effective when trying to solve new problems. Action research is a staff development process which advances professional inquiry, improves education, and promotes teacher development.

4. An eclectic approach, including all three models, is needed in higher educational development to respond to the unique demand of each situation.

The skills which need to be developed are those of each of the practitioners. The technical competence and interpersonal skills are necessary, and the consultant's presentation to the rest of the educational community needs to be that of a colleague and fellow academic. Craft (2000, p. 217) explains the model of professional development.

It is:

- Presentation of theory description of skill or strategy
- Modeling or demonstration
- Practice in simulated or classroom settings
- Structured and open-ended feedback
- Coaching for application.

It is useful to set these ideas along side individual learning preferences in order to develop a fuller picture.

Craft (2000, pp. 10-11) suggests a wide range of methods of professional learning. They include: action research, receiving and/or giving on-the-job coaching, mentoring, personal reflection, experiential assignments and collaborative learning. Being a professional means taking responsibility for identifying and attempting to meet the professional development needs of oneself and one's institution. Bailey, Curtis and Numan (2001, p. 17) state the heart of professional development. They are: choice, trust and honesty, mutuality and reciprocity, better teaching and learning, and the judgmental/developmental distinction. In addition, Bailey et al suggest the procedures of

professional development that can be practised by individual teachers (though some can be collaboratively conducted too):

- Keeping teaching journals
- Using case studies
- Language learning
- Video taping
- Action research (2001, p. 11).

If professional development were a linear process everyone would work through stage after stage. In practice it is more of a cyclic process with development going on all the time and different development activities interweaving with each other (Dean 1991, p. 190). Additionally, the professional development process is a complex set of procedures that involve deciding on lesson content (what you will teach) and format (how you will teach it) putting those decisions to work and evaluating the results. For effective teaching, teachers need to learn about educational knowledge in practical ways, and acquire decision-making and reflective thinking skills. It is important for teachers to keep in mind this combination of theory, action and reflection for professional teaching requires combining the practices and principles of teaching and applying their elements in the classroom (Lang et al 1995, p. 17).

Individual learning preference plays a significant role in what teachers select and how they develop themselves (Craft 2000, p. 199). Teachers must identify strategies for planned action which are implemented, and then systematically submitted to observation, reflection and change. Lang et al (1995, p. 9) state the successful teacher is constantly 'learning on the job.' The major components of teacher education are academic,

professional and practical learning. Only by combining these aspects of teacher education will teachers enrich their ability to form useful concepts that they can apply successfully as a developing professional. Fleming (1998, p. 64) asserts that...

‘an effective professional development cycle is ongoing, building upon itself to continually improve learning outcomes. Effective professional development is never complete. Activities, plans and programs should be regularly monitored and evaluated. Evaluation should provide the new starting point and direction of future development.’

It is the connection between learning and inquiry for developing professional competence that drives this research. Chapter 3 draws on the above literature and research to develop a methodology for investigating the practice of a University teacher as she works with her student teachers in the development of their professional knowledge and practice. The conceptual framework of the reflective practitioner and how learning, thinking, inquiry, and the development of professional knowledge frame professional learning that is described in this review of literature is the basis for the construction of the action research methodology employed.

Framework for the Research

The review of literature which informs this research has included a wide range of topics and themes which provide relevant background information and preparation for undertaking this research. The literature review explored the teaching and learning approaches assist student teachers’ questioning skills. The structure and methodology for the research were developed from the examination of recent research and some long

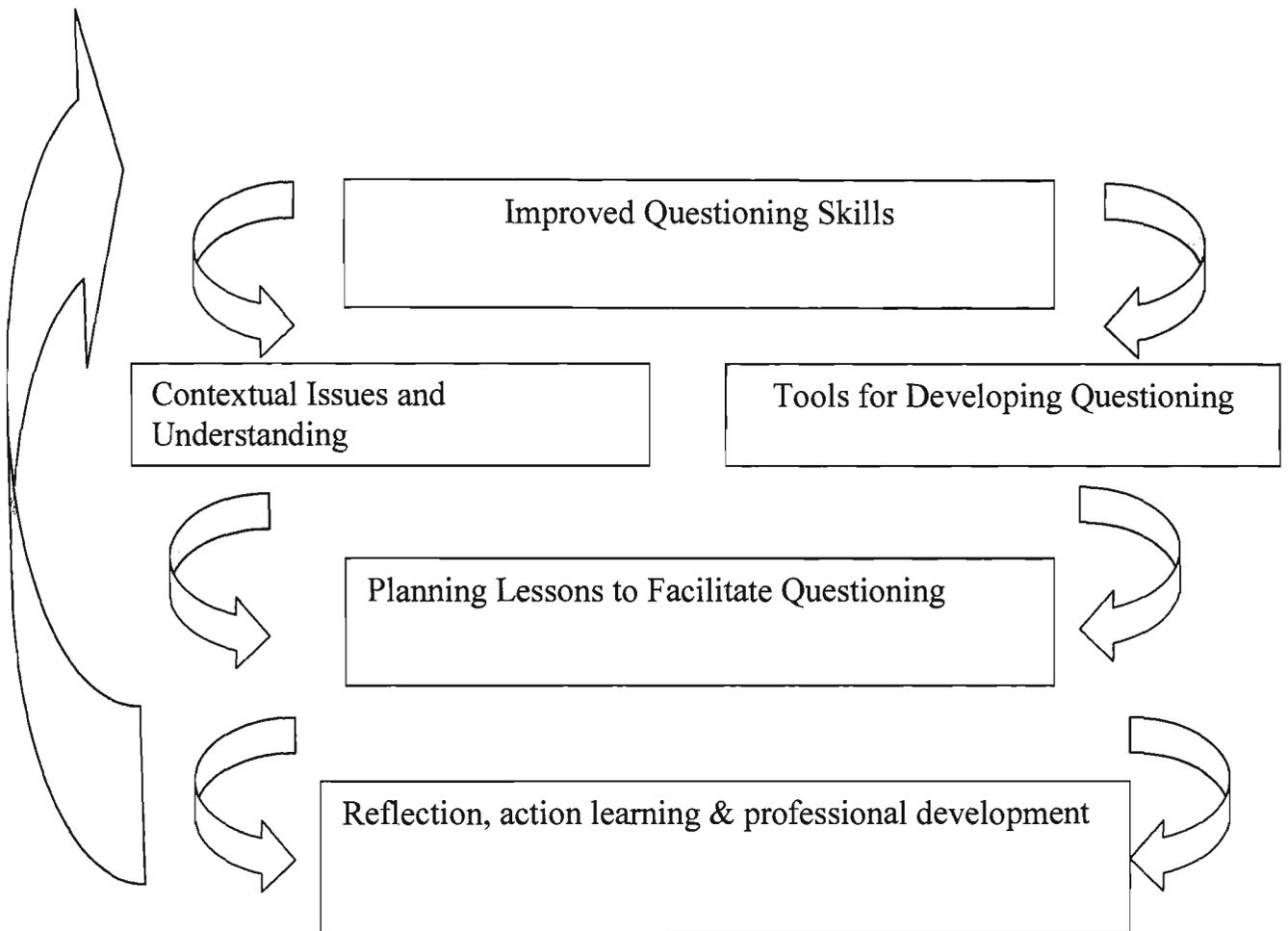
developed and tested theories of thinking, questioning, teaching and learning. The data were analysed drawing from the literature's key themes and claims about inquiry learning, classroom practices and teacher leaning. The results of data collection examined issues such as globalization, the knowledge –based economy and education reform in Thailand as social and educational environment factors in rethinking teaching and learning. The development and application of the thinking process is the key theme explored in relation to student teachers in the university and students in school classrooms. The research focused on questioning skills which is the essential skill for being teacher. Questioning can trigger the thinking process development. Hence, inquiry approach challenges independent and be active learner to develop questioning. The learner-centered approach or constructivist approach were planned in the implement in the university classroom. These main paradigms of learning were found to support learners as they learn how to learn and think effectively.

The methodology and research plan therefore are also constructed with these issues and concepts in mind. A systematic approach was used to develop and implement the university classroom lesson plans each semester. Additionally, a wide range of learning activities concerned with questioning, were designed and applied with student teachers as they explored their role as active learners in their university classroom. Building on the findings of this literature review, the university classroom promoted student teachers creative and critical thinking. This aimed to enhance the thinking, discussion, reflection, metacognition, questioning and answering within the classroom climate which emphasized a humanist framework. In this way, student teachers had experience in

teaching and questioning in the university and school classroom. They learned through action and experiential learning.

Finally, the literature review sets a new direction for teacher professional development. An effective teacher should be a life-long learner and be competent in inquiry approaches so as to develop learners in learning how to learn. The findings from the literature review establish a base for the full inquiry outlined in this research and support the response to the research question: *What teaching and learning approaches assist the development of student teachers' questioning skills?* The figure 2.10 shows the conceptual framework of the research that is facilitating questioning skill of student teachers through action research. Collectively this overview of international practice provides a framework for exploring each of the key elements in this research program. The model below illustrates the conceptual framework for the research.

Figure 2.10 Conceptual Framework for the Research



The conceptual map in Figure 2.10 is further elaborated below.

1. Facilitating Questioning Skills
 - Understanding issues and effective practices
 - Inquiry approaches

2. Contextual Issues and Understanding
 - Knowledge-based economy
 - What is learning?
 - Higher-order thinking

- Classroom environment
- 3. Tools for Developing Questioning in the University/School Classroom
 - Bloom's taxonomy as a framework of developing thinking process
 - thinking types and styles
 - tools for developing thinking
 - classroom management strategies
 - tools for teaching thinking
- 4. Strategies for Planning Lessons to Facilitate Questioning in Classrooms
 - Teaching thinking skills
 - a. Creative thinking
 - b. Critical thinking
 - c. Six Thinking Hats
 - d. Cooperative learning
 - Strategies to develop reflective and metacognitive thinking
 - Questioning and answering
 - Good questions

For

- understanding teaching and learning styles
- curriculum development
- classroom organization
- content development

5. Reflection, Action Learning and Professional Development

- Action learning
- Reflective teaching and learning
- Self and group assessment
- Teacher professional development

For

- improving classroom practices in questioning
- strategies for documenting and reflecting on practice
- action learning and research as professional development
- mentoring, peer review and observation
- using classroom data, work samples, journals and observational notes as evidence
- teacher researcher skills and practices
- Independent and lifelong/ career-long professional learning for teachers

The conceptual framework is elaborated as a set of key connected themes each of which informs either the background to the research, provides a framework for understanding inquiry pedagogy and appropriate skills in questioning, and strategies for the methodology itself including reflection, action learning and research. In this way, the reach of the literature review is powerful and demonstrates a connected learning experience for the participants, their students and the researcher.

Significantly, it recognises the specific context of Thai education, its achievements to date and directions which have been outlined for the future by the new education act.

The research is understand how questioning skills can be developed in this context, bearing in mind the importance of classroom environment, inquiry approaches, higher order thinking development and the development of a continuous professional development approach to teacher education. All these elements are relatively new for Thai teacher education but the above literature review outlines a range of principles and strategies for new democratic classroom practices which stimulate deeper learning through improved teacher education and specifically the development of student teacher thinking skills. The challenge to identify which of these 'western' approaches can be applied in the Thai setting, and what other approaches are appropriate.

Chapter 3

Methodology

Action Research is the methodology chosen for this research because, as can be seen from the extensive review of the literature and research in Chapter 2, it is a most appropriate way to study and improve personal professional practice. Kember and Kelly (1993, pp.2-4) propose that action research is research undertaken by teachers in order to change and improve their own practice and develop as a reflective professional in the field. It should be a continuing number of cycles of inquiry and builds on action learning principles. The process is initial reflection, planning, action, observation and further reflection. Macintyre (2000, p.7) claims that action research in the classroom can be creative because teachers themselves can choose a topic which is intriguing and challenging their own practice, as well as being appropriate for improving opportunities for learning for the students. Action research is the study of a real workplace situation with a view to improvement in the quality of actions and results. It aims also to improve personal professional judgement and to give insight into how to better achieve desirable goals, in this case with regard to pre-service and classroom teaching and learning.

Action research is systemic and public inquiry which will allow the gathering of information about teaching and learning, especially with regard to the questioning skills of teachers and student teachers, and subsequently improve the ways the particular classroom operates, how the researcher facilitates inquiry, and how well student teachers learn. Zuber-Skerritt (1992a, p. 16) suggests action research activities as the following:

1. identify and analyze a problem
2. design strategies for solving the problem
3. implement and test the strategies
4. evaluate the effectiveness of the new strategies
5. reflect on the results as a team
6. arrive at conclusions and / or newly identified problems
7. repeat this cycle again until satisfied that there has been effective improvement
8. report findings.

These activities follow the procedures of systematic action research as developed by Kemmis and his associates, who see the four fundamental moments of action research linked dynamically in a cycle: to plan, to act, to observe and to reflect. Action research offers a means for changing from current practice toward better practice (Schmuck 1997, p.28). The purpose of action research is to develop new skills or new approaches and solve problems with direct application to the classroom or working world setting (Isaac and Michael 1990, p.55). The fundamental aim is to

improve practice rather than produce knowledge (Elliott 1991, p.49) although the production of new knowledge is the stimulus for the change in practice.

The main benefit of action research is the improvement of practice in order to achieve the full potential (Zuber-Skerritt 1992a, p.15). Elliott (1991) states that

'Action research allows teachers to explore and improve practice by developing the practitioner's capacity for discrimination and judgment in particular, complex, human situations. It unifies inquiry, the improvement of performance and the development of persons in their professional role. With respect to the latter it informs professional judgement and thereby develops practical wisdom' (p. 52).

Techniques of data collection

This research employed a range of data collection techniques to capture a triangulated view of teaching and learning practices in the classroom and to identify the outcomes of those practices for the teacher, student teachers and school students. Observational techniques, non-observation techniques and evaluation were used in research (Burnaford, Fischer and Hobson 1996, p.73). The specific strategies employed are as follows:

1. Observational techniques

- Journal of the lecturer / Learning logs of student teachers
- Photographs

- Tape recording
- Interview notes

2. Non observational techniques

- Interview (The degree of structure the relationship between interviewer and interviewee)
- Art, other demonstration of student teachers learning or creativity
- Document collection; lecturer: journal + subjects plan and lesson plans, Student teachers: journal, lesson plans + evaluations

3. Evaluation techniques

- Self evaluation of student teachers
- Peer teaching
- Lecturer's journal

Stages of the data collection

The collection of data in this action research project followed through four stages as part of two complete action research cycles, the latter designed to build on the outcomes of the first cycle.

Stage 1 (Semester 2, 2002: November – February)

Selection of participants

The participants were ten student teachers from a class of the twenty-one student teachers who enrolled in the General Methods of Teaching subject, a teaching preparation subject which was conducted over one full semester. It was taught by the lecturer in the second semester of the 2002 academic year, and student teachers were invited to nominate to participate in the research after all assessment was completed and grades assigned to them. Student teachers were second year student teachers at the Faculty of Education, Burapha University. No data gathered during the research phase was used to assign student grades in the subject. Student teachers were encouraged to participate in the hope that they would be able to improve their practice. All data collected with each student teacher was accessible to only them and the researcher.

Assessment of the course was 50% individual work and group work, and 50% final examination. Student teachers' individual work was writing a learning log (10%), writing lesson plans (10%) and demonstration teaching (10%). Student teachers group work was assessed through their reporting and presentation (10%) and group teaching (10%). All work was graded and returned to the student teachers before being invited for inclusion and then collected to be analysed in the research.

Participants were able to withdraw from the research at any time without any penalty or impediment to their course of study and academic program.

Student teachers were invited to participate in the research which analysed their records of practice. All student teachers were informed of the research in the first class at the commencement of semester. They were informed that at the end of semester, after all grades had been assigned and made known to the student teachers that they would be invited to participate in the research and that no additional tasks would be required of student teachers for the research. There were eighteen student teachers who volunteered at the end of the semester, so random sampling was used to select ten student teachers who then participated in the research and whose work is reported in this thesis. The implementation of the General Methods of Teaching subject started on November 2002 and ended in February 2003. The General Methods of Teaching subject was chosen for facilitating the development of the questioning skills of student teachers. The long-range plan consisted of sixteen weeks of teaching and learning in the university classroom (Figure 3.1).

Figure 3.1: Long-range Plan General Methods of Teaching of Teaching Course

<i>Period (Week)</i>	<i>Source</i>	<i>Activities</i>	<i>Material / Aids</i>	<i>Evaluation</i>
1	Course orientation	- Introduce each other - Introduction of course - Introduction of group work and Individual work	- Course syllabus 404361 - Cards - Crayons	Observation
2	- National Education Act of B.E. 2542/1999 - National Education Guidelines - Educational goal	- Discussion - Lecture - Group learning - Concept mapping	- Cards - Transparencies - Paper - Crayons	- Observation - Informal interview
3	- Learning - Learning process - Learning and teaching	- Group work - Group process - Case study - Problem solving tasks - Discussion	- Work sheet - Transparencies - Cards	Observation
4	- Curriculum in school	- Reporting and presentation - Team interviewing	- Transparencies	- Observation - Informal interview - Report and presentation - Self evaluation
5	Writing objectives	- Lecture - Discussion - Group learning	- Transparencies - Work sheet	- Observation - Exercise
6	- Foundation of teaching - Essential teaching skills	- Case study - Lecture - Discussion - Simulation	- Transparencies - Script - Sheet - Flow charts	- Observation - Informal interview
7	Teaching strategies (The example of teaching strategies)	- Discussion - Cooperative learning	- Video - Work sheet	Observation
8-9	Teaching strategies	- Demonstration Teaching - Reporting - Group teaching - Simulation - Role play - Discussion	- Reports	- Observation - Checking reports - Group teaching - Self evaluation (8 th week)
10	Planning Lessons - Types of lesson plan - Long-range plan	- Case study - Cooperative learning - Lecture - Discussion	- Long-range plan - Transparencies	- Observation - Exercise
11	Planning Lessons - Daily lesson plan	- Case study - Group learning - Lecture - Discussion	- Daily lesson plan	Observation - Exercise - Self evaluation
12	- Student and	- Lecture	- Transparencies	Observation

	classroom management - Creating a positive learning environment	- Discussion - Cooperative learning	- Work sheets	
13-16	- Demonstration teaching	- Demonstration teaching - Discussion	Lesson plan	- Observation - Demonstration teaching - Self evaluation (16 th week)

Activities in the university classroom

1. Met new the second year of student teachers
2. Provided orientation and information about the research
3. Taught about questioning student teachers by set lesson plans (Appendix A)
4. Student teachers wrote learning log and the lecturer wrote journal.

Observed student teachers in questioning, answering and peer teaching in the classroom.

5. Collected lesson plans and learning log of student teachers
6. Student teachers evaluated their own learning (Appendix B)

Data collection

1. Met ten student teachers who were participants
2. Interviewed ten student teachers at the end of semester (Appendix C)
3. Collected lesson plans and learning log of ten student teachers
4. Reflected on classroom activities
5. Reflected of the implementation of the subject, the roles and learning of the student teachers and the outcomes of the subject, including plans for improvement in practice.

Stage 2 (Non-teaching period 2002 - 2003)

Initial data analysis

1. Analyzed data to look at their understanding and practice of using question skills by using simple coding and bundling of emerging themes and issues and interpretative analytical approaches.
2. Made a plan for improving teaching

Stage 3 (Semester 1, 2003: June – September)

Selection of participants

In the second semester all of the above group of ten student teachers who participated in the research in Stage 1 and 2 were invited to participate in the continuation of the project. They were all enrolled in Professional Experience 2 in this semester and there were twenty-one students in all enrolled. There were five participants who were then randomly selected from the group in 'Professional Experience 2' class, an undergraduate teaching preparation subject for the third year student teachers at the Faculty of Education, Burapha University. It was taught by the lecturer in the first semester of the 2003 academic year. Again, the same assessment and data procedure was followed and no data gathered during the research phase was used to assign student grades in the subject.

The assessment strategies and data collection practices for the second cycle were modeled on those used in the first cycle. All data collected from each student teacher

was accessible to only the individual participant and the lecturer. Assessment of the course was 50% individual work and group work and 50% final examination.

Student teachers' individual work was writing a learning log (10%), writing lesson plans (10%) and demonstration teaching (10%) student teachers group work was assessed by reporting and presentation (10%) and group teaching (10%). All work was graded and returned to the student teachers before they were invited for inclusion in the research and collected to be analysed in the research. Participants were able to withdraw from the research at anytime without any penalty or impediment to their course of study and academic program as this decisions about inclusion in the research was after the completion of the subject.

Student teachers were invited to nominate to participate in the research which analysed their records of practice, such as lesson plans and learning logs. All student teachers were informed of the research in the first class at the commencement of semester. They were informed that at the end of semester, after all grades had been assigned and made known to the student teachers that they would be invited to participate in the research and that no additional tasks would be required of student teachers for the research. There were nine student teachers who volunteered from the original ten in Stage 1 and 2, so random sampling was used to select five student teachers who then participated. The implementation of the Professional Experience 2 class started in June 2003 and ended in September 2003. Professional Experience 2 was chosen for facilitating deep understanding the questioning skills of student teacher. The long-range plan consisted for sixteen weeks (Figure 3.2).

Figure 3.2 : Long-range Plan of Professional Experience 2 Course

<i>Period (Week)</i>	<i>Source</i>	<i>Activities</i>	<i>Material / Aids</i>	<i>Evaluation</i>
1	Course orientation	- Getting to know each other - Introduction of course - Introduction of group work and individual work	- Course syllabus 404362 - Name cards	- Observation
2	Example of activities provide by the model teacher - primary school - secondary school	- Reporting and presentation - Team interview - Discussion - Questioning and answering	- Reports - Cards	- Observation - Report and Presentation
3	Teaching skills	- Case study - Discussion - Cooperative learning - Six Thinking Hats	- Video - Work sheet - Cards - Six hats	- Observation
4	Planning lessons - Daily lesson plan	- Discussion - Cooperative learning - Presentation	- Transparencies - Lesson plans - Work sheet	- Observation - Checking lesson plans - Self evaluation (4 th week)
5-7	- Practice teaching	- Demonstration teaching - Discussion	- Lesson plans - Observation Form	- Observation - Teaching skills - Self evaluation (7 th week)
8-9	Practice experience in teaching profession	- Observation teaching and learning in the classroom - Practice working of teacher profession	- School	- Observation - Informal interview
10	- Seminar and planning the lesson plans	- Discussion - Questioning and answering - Planning teaching in the school - Cooperative learning	- Work Sheet - Cards	- Observation - Self evaluation (10 th week)
11-14	- Practice in teaching in the school	- Teaching in the school classroom	- Lesson plan - Observation form	- Observation - Checking lesson plan - Practical in teaching - Self evaluation (14 th week)
15	Reflection in learning (Seminar)	- Discussion - Cooperative learning - Questioning and answering - Conclusion	- Learning log - Cards	- Observation
16	Final examination	-	-	-

Activities in the university classroom

1. Implemented new teaching plan for the third years of student teachers
2. Set lesson plans (Appendix D)

Data collection

1. Student teachers wrote learning logs and lecturer wrote journal
2. Observed student teachers in questioning, answering and demonstration teaching in the classroom.
3. Observed teaching student teachers in demonstration school and reflective group interview with student teachers by using tape recording (Appendix C)
4. Student teachers evaluated their own learning (Appendix E)
5. Documents were collected

Stage 4 (Semester 2, 2003)**Development of thesis / dissertation**

1. Final analysis
2. Findings outlined and reported

Data analysis

Interpretative approaches which drew on simple coding techniques and descriptive statistics were used to illustrate and substantiate interpretations. Analysis was intermixed with presentation of data. The data were in the form of quotes by participants and described what had been learned by synthesizing the information (McMillan and Schumacher 1997; Glaser 1992). There were two cycles of data analysis for the research. The analytical framework was used for responding and interpreting the data gathered was based on an initial exploration to identify themes, concepts and issues. Then Bloom's Taxonomy and de Bono's Six Thinking Hats were used to interpret the questions developed, posed and planned by student teachers.

Cycle 1

1. Simple coding and bundling were used to support analysis for identifying key themes, ideas, concept and practices, such as listening, the use of closed questions, open questions and deep reflective practice and comment. Drawn from the principles of grounded theory, bundling and coding enable the common themes and concepts to emerge from the data and not to be pre-determined by the researcher. Glaser states that...

'Grounded theory is a means of qualitative analysis that is designed to bring out skills of conceptual analysis. Conceptual skills for doing grounded theory are absorb the data as data, to be able to step back or

distance oneself from it, and then to abstractly conceptualize the data.

There are three major components: (1) data collection, which soon becomes intricately involved in (2) the methods analysis, that soon generate the concepts, hypotheses and their integration which result in the production of (3) written and verbal presentations' (1992, pp.11-13).

2. Descriptive statistics was used in frequency analysis. Descriptive statistics have been used to identify the questioning approaches and types of questions that student teachers asked and planned for in their teaching. Lesson plans, journal writing, learning logs and records of university classroom practice were examined using Bloom's (1956) of thinking process to consider the type and approach of questions used by student teachers. Similarly, de Bono's Six Thinking Hats were also used as a basis for sorting and bundling the questions of student teachers and to assist identification of various perspectives on thinking which student teachers' questions could stimulate.
3. Interpretation of the data was recorded at the end of Stage 1 to establish tentative findings as the basis for new plans of Stage 3.

A plan for further development of questioning skills in Stage 3 of the implementation was then made.

Cycle 2

The analytical structure from Stage1 (Cycle1) was replicated.

1. Simple coding approaches support analysis to confirm new ideas and add new ones.
2. Descriptive statistics was used in frequency analysis of questions and questioning.
3. Interpreting the data to establish findings, making connections and posing generalizations / findings.
4. Conclusion and recommendations.

The data analysis of Stage 1 (Cycle 1) and Stage 3 (Cycle 2) is shown in Chapter 4 and Chapter 5. Chapter 4 reports Stage 1 (Cycle 1) which included activities in the university classroom. Descriptive statistics, simple coding and bundling were used in Stage 1 (Cycle1). The data analysis focused on the questioning of student teachers through the classroom activities, Six Thinking Hats, lesson plans, self-evaluation, learning log, lecturer's journal and group interview. Bloom's Taxonomy (1956) and de Bono's Six Thinking Hats (de Bono 1987) were used as bases for analyzing the data by identifying the questions student teachers asked. The final reporting in Chapter 4 is reflection of implementing the first cycle. Learning from the Stage 1 (Cycle 1) led to plan for Stage 3 (Cycle 2) which promotes student teachers higher order thinking.

Chapter 5 presents the reporting of the Stage 3 (Cycle 2). The data analysis and presentation are the same as the Stage 1 (Cycle 1). The details are shown by focusing on the learning and developing skills in questioning of student teachers in the university and school classroom. Learning from Stage 1 (Cycle 1) and Stage 3 (Cycle 2) was used to guide the discussion of findings and recommendations in Chapter 6.

Chapter 6 presents the discussion of findings. It begins with the three elements which were developed to achieve the teaching goals for both the university and school classroom-lesson plans, learning process, and practical activities in the classroom. Then it is followed by the comparison of the data gained from activities drawing on the information from Six Thinking Hats activities, lesson plans, self-evaluation, journal, learning logs and group interview along with its discussion. The proposal for a new paradigm for university learning is presented at the conclusion of the research in Chapter 7.

Chapter 4

Getting Started with Questioning

'..... At first, I was bored with questioning because I don't like to think. Now I am aware of the need to ask questions. Questions are powerful.'

(A student teacher reflecting on her thinking)

This chapter reports the analysis of the first stage of the data collection. It is specifically concerned with the initial implementation of new teaching methods and approaches which focus on the development of the thinking and questioning skills of student teachers who are students in the General Methods of Teaching subject. This subject is a general introduction to pedagogy, curriculum design and classroom management for year 2 student teachers. In this subject student teachers are expected to develop and teach lessons to their peers in a range of curriculum areas.

For the first time, the university teaching of this subject was changed to reflect and demonstrate, as well as introduce a range of strategies which would support student teachers to become more active participants, questioners and thinkers about their own learning as they prepare to be teachers. In doing so, the subject was designed to model practices which the student teachers could then incorporate in their own lessons

for primary aged school students. In this way, both the theoretical content of the subject and pedagogy developed for teaching the subject were instructional in fostering the development of student teachers' questions and thinking so that they might generate similar practices with school students.

Reporting Stage 1 (Cycle 1)

The General Methods of Teaching class was implemented in the second semester of the 2002 academic year from November 2002 to February 2003. All work of student teachers and the lecturer was considered and analyzed. These documents included student teacher lesson plans and self-evaluations, their learning logs, lecturer's journal and the transcripts of group interviews. Reflection on the implementation of the research project focused on teaching and learning approaches applied for the development of the teaching of questioning. This research gathered data about student teachers and their work at the university classroom during the second semester.

The General Methods of Teaching course was designed to develop an understanding of educational goals, curriculum in school, the nature of the learning and teaching process, models of teaching, classroom management and practice in teaching. The specific aims of the subject are as follows:

- To clarify the educational goals, curriculum in school, the nature of the learning and teaching process, models of teaching and classroom management;
- To introduce lesson planning and lesson plan format;

- To provide an opportunity for student teachers to review their learning from the subject;
- To engage in practice teaching in the university classroom;
- To promote learning and teaching for teacher profession;
- To promote a positive attitude towards work.

There were sixteen weeks of implementation in the subject. The lecturer set the lesson plans for the teaching of the subject with the purpose of facilitating effective student teacher learning. The learning activities were designed mainly around cooperative learning, the application of de Bono's Six Thinking Hats, discussion and demonstration teaching. The process of questioning was integrated in the learning activities throughout the lesson plans and these are detailed in Appendix A.

The data gathered in this stage of the research was analyzed by identifying the questions student teachers asked, then sorting and bundling them according to two thinking models - Bloom's Taxonomy (Bloom 1956) and de Bono's Six Hats (de Bono 1987). By looking at student teachers' questions in this way, the lecturer was able to capture information about how the student teachers were thinking, interacting and questioning each other and the lecturer in the university classroom. This analysis informed the development of an understanding of the thinking, action and questioning of the student teachers as learners. Additionally, information was gathered about how student teachers applied the knowledge and experience they had in the subject to support the design of their lesson plans and in their own practice teaching with their peers in the university classroom.

University classroom activities

Using Bloom's Taxonomy as a framework for sorting the questions revealed that student teachers included structured and purposeful questioning in their planning for teaching in university classroom. Moreover, Bloom's Taxonomy was useful for identifying the range of thinking processes evident in the questions student teachers used and posed. Bloom's processes are knowledge, comprehension, application, analysis, synthesis and evaluation. Student teachers have learned that by focussing their questioning on Bloom's levels they are able to identify different types of questions and to use them in different situations to stimulate thinking and knowledge development in their practice teaching with peers in university classroom. The categories of questions that were asked the most by student teachers were 'comprehension' questions, 'knowledge' questions and 'not clear' or 'other' questions respectively. This last group were often statements or questions which showed no connection to the work presented or which were unclear in their meaning.

The frequency of different types of questions is shown in Figure 4.1. Questions which focus on 'comprehension' are the most common. The second most common are 'knowledge' questions. The third most frequently occurring are those questions which were considered are in the category determined as 'other' or 'not clear'.

Some student teachers set 'comprehension questions' (ST3, ST6, ST7), and those most frequently identified and applied were comprehension focused questions.

Others set 'knowledge focused questions' (ST1, ST2, ST9) and ST4 and ST5 set

questions which are 'not clear' or 'other'. Again, the 'not clear' or 'other' questions includes the questions that were not related to the situation, the questions that do not fit any categories, or sentences that were not questions. There were very few questions posed and asked which stretched thinking to synthesis or evaluation (6.33% and 1.26% respectively).

Figure 4.1: Frequency of Questioning of Student Teachers in Classroom

Activities Which Reflected Bloom's Taxonomy Thinking

Student Teachers	<i>ST1</i>	<i>ST2</i>	<i>ST3</i>	<i>ST4</i>	<i>ST5</i>	<i>ST6</i>	<i>ST7</i>	<i>ST8</i>	<i>ST9</i>	<i>ST10</i>	Total	Percent
Categories												%
Of Questions												
<i>Knowledge</i>	3	2	2	3		1	1	3	4		19	24.05
<i>Comprehension</i>	1	1	5	2	2	3	3	3	3		23	29.11
<i>Application</i>	1	1	1			1	1	2	1	2	10	12.66
<i>Analysis</i>				1		2		5		2	10	12.66
<i>Synthesis</i>						1		2		2	5	6.33
<i>Evaluation</i>					1						1	1.26
<i>Others</i>	1	1		4	3			2			11	13.92
<i>(Not clear)</i>												
Total	6	5	8	10	6	8	5	17	8	6	79	100

The activities in the university classroom were set and implemented every week through various strategies such as reading activities, role play and demonstration. Student teachers had an opportunity to ask questions and record their questions on cards. After that, the questions asked by the student teachers were analysed.

Examples of questions which were considered to be 'not clear' or 'other' are as follows:

'The allocation of course in the curriculum with regard to time, focusing content and final examination?' (This comment does not fit any category and the sentence is not question.)

'There are details that are difficult: I am worried that my students cannot learn?'
(This comment does not fit any category and the sentence is not question.)

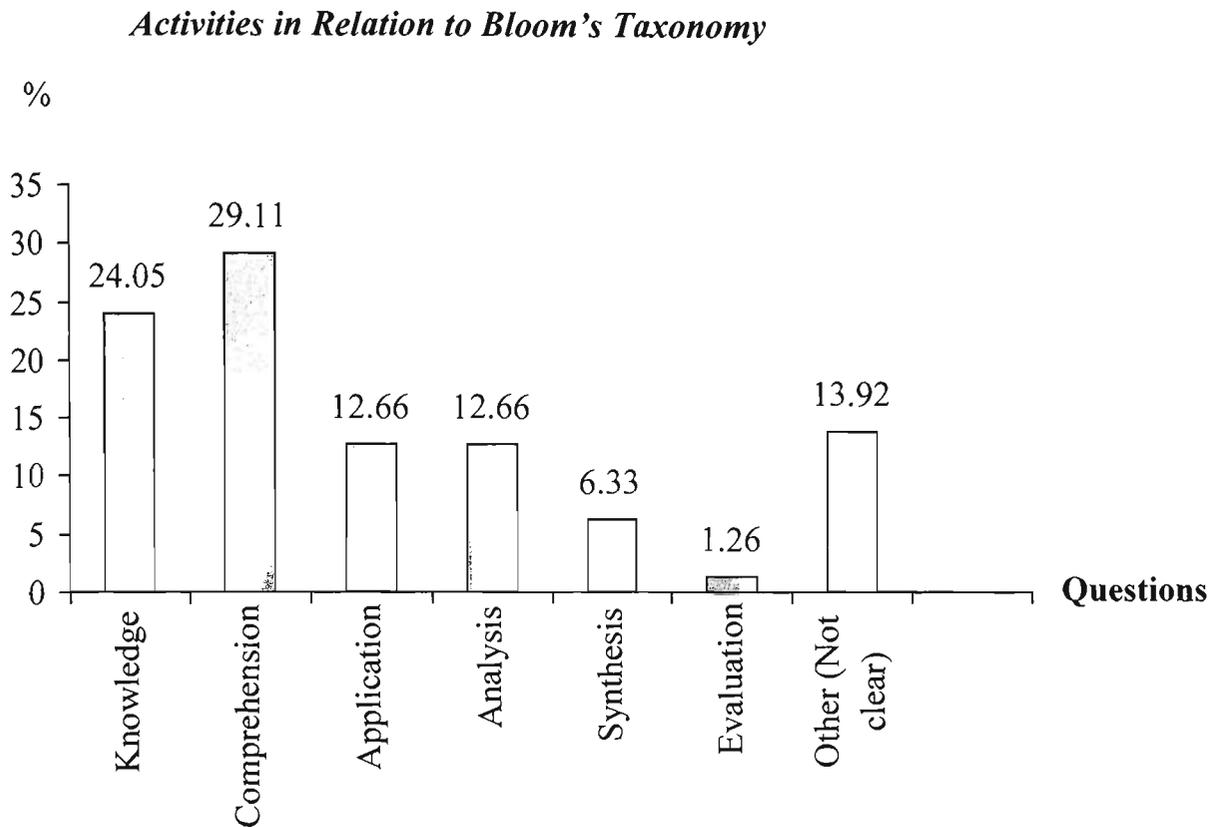
'What are the needs of school students?' (The question is not related to the situation.)

'Local curriculum development, is the principle of academic knowledge such as physical, chemical and biological?' (This comment does not fit any category and the sentence is not question.)

'Student-centered approaches are important but the basics for student teachers is that they are too shy to ask and answer, how did we do?' (The question is not related to the situation and is more about reflection than a question to probe learning in others.)

The details of the summary of student teacher questioning in relation to Bloom's Taxonomy is shown in Figure 4.2.

Figure 4.2: Summary of Questioning of Student Teachers in Classroom



The Six Thinking Hats (de Bono 1987) is a strategy which was implemented in the teaching of General Methods of Teaching course. Student teachers were introduced to the Thinking Hats and encouraged to use them to structure their own thinking and then later to include them in the development of lesson plans for their own teaching in university classroom. Student teachers were asked to focus their thinking on the perspectives of the six coloured hats. Each coloured hat reflected thinking, learning and questioning. The focus of each of the Six Thinking Hats is summarised as follows:

- The white hat involves information seeking and factual thinking;
- The red hat involves feeling and emotional thinking;
- The black hat involves the weaknesses or negative thinking;
- The yellow hat involves with the benefit or strength values thinking;

- The green hat involves creative thinking;
- The blue hat involves with organization or management thinking (de Bono 1987).

Every student teacher practised setting questions which draw on each type of thinking hat perspective. Student teachers presented the details for their own teaching strategies. Each student teacher was required to write a question about the lesson content on reporting their own learning which focused on the Six Thinking Hats. Student teachers did not set questions if they were presenters. There were twelve groups of student teachers reporting. Hence, there were eleven questions in the learning activities. The number of questions in relation to each of the Six Thinking Hats asked by each student teacher is shown in Figure 4.3.

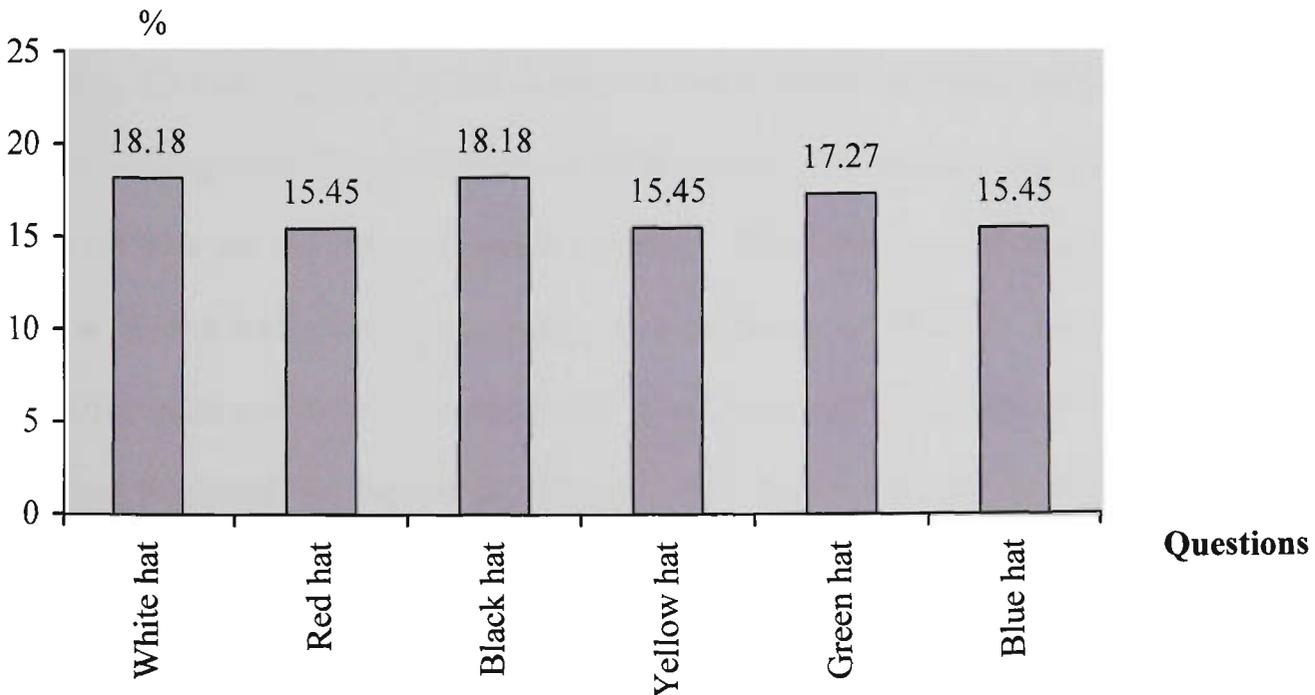
Figure 4.3: Frequency of Questioning on Six Thinking Hats of Student

Teachers in Classroom Activities

Student Teachers	<i>ST1</i>	<i>ST2</i>	<i>ST3</i>	<i>ST4</i>	<i>ST5</i>	<i>ST6</i>	<i>ST7</i>	<i>ST8</i>	<i>ST9</i>	<i>ST10</i>	Total	Percent
Six Thinking Hats												%
<i>White hat</i>	3	2	1	2	2	2	2	1	3	2	20	18.18
<i>Red hat</i>	2	1	2	1	2	1	2	2	2	2	17	15.45
<i>Black hat</i>	1	2	2	3	2	2	2	2	3	1	20	18.18
<i>Yellow hat</i>	2	2	2	1	1	2	2	2	1	2	17	15.45
<i>Green hat</i>	2	2	2	2	2	2	2	2	1	2	19	17.27
<i>Blue hat</i>	1	2	2	2	2	2	1	2	1	2	17	15.45
Total	11	110	100									

Even though there was a relatively small number of questions included at this early stage which could be identified as reflective of the Six Thinking Hats's perspectives, there was an almost even spread of examples from each of the Six Thinking Hats. The percentages of student teachers asking 'white hat' and 'black hat' questions (18.18 %) are the highest. The second most commonly used questions were the 'green hat' questions (17.27 %). The third most commonly used questions were 'red hat', 'yellow hat' and 'blue hat' questions (15.45 %) (Figure 4.4). This is not surprising given the Thai educational context and practice where answers are right or wrong and where creative and critical inquiry has not been fully developed or valued in students.

Figure 4.4: Summary of Questioning on Six Thinking Hats of Student Teachers in Classroom Activities



Lesson plans

Student teachers were presented sixteen lesson plans in the Stage 1 (Cycle 1) of the research through the General Methods of Teaching class work. The teaching and learning approaches used reflected many strategies such as cooperative learning, discussion, role playing, presentation and demonstration teaching. Because student teachers were explicitly taught about Bloom Taxonomy and Six Thinking Hats many began to also think about how these strategies could be applied to their own lesson planning and practice teaching approaches. Each student teacher was required to write his/her lesson plan for teaching in the university classroom. Moreover, student teachers were required to set at least six questions in each lesson plan. Analysis of the lesson plans revealed that student teachers had developed an understanding of questioning. Student teachers applied their knowledge and understanding through action learning as described by McGill and Beaty (1955) and Brockbank and McGill (1998, p. 221) who note that critical experience and conscious reflection can result in new and changed practices and behaviors for the future. Seventy questions were analyzed from the lesson plans of student teachers. The questions most frequently used by student teachers were 'knowledge' focused questions (48.57%). The second most frequently used were 'comprehension' questions (21.42 %) and the third most common were 'analysis' focused questions (8.57%). The least common questioning forms used by student teachers were those which encourage 'synthesis' (4.28 %) and 'evaluation' (4.28 %) (Figure 4.5 and 4.6). These results reflect other research on thinking skills which indicates that many student teachers can function at the early stages of Bloom's Taxonomy, but fewer demonstrate synthesis or evaluation skills in

the tasks prepared for their school students, even when they are presented in university classrooms (Lang et al 1995, p.158).

Figure 4.5: Frequency of Questioning from Lesson Plans of Student Teachers

Student Teachers	ST1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9	ST10	Total	Percent %
<i>Knowledge</i>	2	4	4	2	1	1	2	11	5	2	34	48.57
<i>Comprehension</i>	3	2	2		2	1	1	1	1	2	15	21.42
<i>Application</i>				2	1	1				1	5	7.14
<i>Analysis</i>				1	1	1	1		1	1	6	8.57
<i>Synthesis</i>			1		1		1				3	4.28
<i>Evaluation</i>	1	1				1					3	4.28
<i>Others</i>		1		1					1	1	4	5.71
<i>(Not clear)</i>												
Total	6	8	7	6	6	5	5	12	8	7	70	100

Some examples of 'not clear' or 'other questions', ie questions that are not related to the situation, the questions that do not fit any categories, and the sentences that are not questions, are as follows:

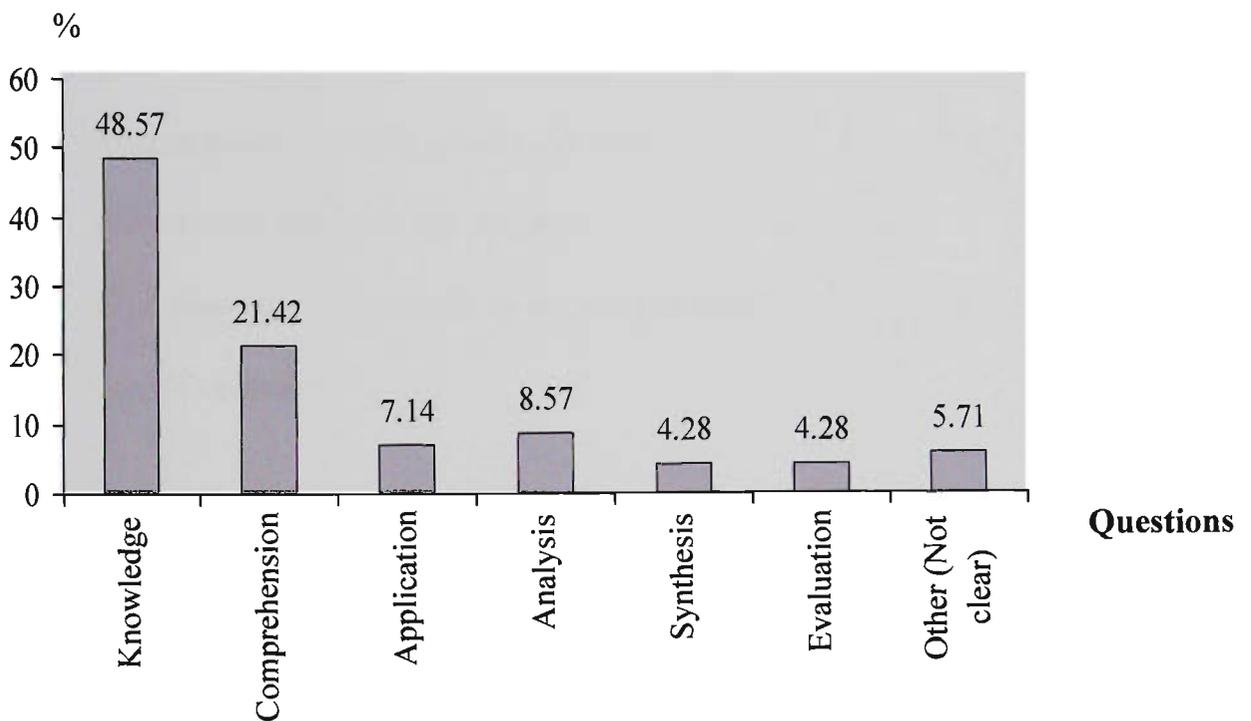
'The beautiful pig is confused about how a mother duck has a baby.' (The question is not related to the situation, and not a question.)

'Do you know what assignment you will do?' (The question is not related to the situation.)

'When you stay at home, do you exercise?' (The question is not related to the situation.)

Are you proud to be Thai? Thailand has a nice culture. (The question is not related to the situation. The second sentence is not a question.) This is again consistent with the learning approaches traditionally employed in Thai schooling were didactic teaching and the transfer of facts and knowledge based learning dominates.

Figure 4.6: Summary of Questioning on Lesson Plans of Student Teachers



Self-evaluation

Each student teacher formally reflected on their experience and learning through a self-evaluation exercise every fourth week in the General Methods of Teaching class.

Each student teacher evaluated their learning, thinking and questioning in the university classroom. Self-evaluation was the process to promote thinking process and led student teachers to look at the past and evaluate their learning. This meant four self-evaluations by student teachers. They evaluated themselves by answering seven questions. They are as follows:

1. What have you learned from this subject?
2. What were your learning strategies?
3. Were you successful in your learning by using those strategies?
4. What skill do you think you are good at?
5. What do you think you can improve?
6. What else do you need to do to improve yourself?
7. Other/Comments?

The analysis of the student teacher evaluations showed that most student teachers have reported that they learned the content (knowledge) of subject (95%), thinking process (40%), cooperative learning (27.5%) i.e. learn from sharing and group process, teaching skills (22.5%) and questioning (20%). Presentation, analysis, synthesis and learning process (2.5 %) are reported as the least likely to be learned. This reflects their traditional experience of curriculum under the old Thai education system has been previously described by other researchers of school classrooms

(Wilson and Wing- Jan 1993, pp.6-7; Pappas and Tepe 2002: Office of the National Education Commission 2000a). A summary of the student teacher evaluation data is shown in Figure 4.7.

Figure 4.7: Self-evaluation of Student Teachers With Respect to What They Have Learned from the Subject

Student Teachers	<i>ST1</i>	<i>ST2</i>	<i>ST3</i>	<i>ST4</i>	<i>ST5</i>	<i>ST6</i>	<i>ST7</i>	<i>ST8</i>	<i>ST9</i>	<i>ST10</i>	Total	Percent
Learning												%
<i>Knowledge</i>	4	3	4	4	3	4	4	4	4	4	38	95
<i>Questioning</i>			3		1		1		1	2	8	20
<i>Answering</i>			1		1		1		1	1	5	12.5
<i>Thinking process</i>		2	2	1	2	2	3	1	2	1	16	40
<i>Metacognition</i>		1								1	2	5
<i>Cooperative Learning</i>			2				4	1	3	1	11	27.5
<i>Discussion</i>					1		1				2	5
<i>Presentation</i>										1	1	2.5
<i>Teaching skill</i>		2	1	1	1	1	2		1		9	22.5
<i>Application</i>						2					2	5
<i>Analysis</i>		1									1	2.5
<i>Synthesis</i>		1									1	2.5
<i>Observation</i>		1			1						2	5

<i>Discipline</i>										2	2	5
<i>Self- confidence</i>			1							3	4	10
<i>Learning process</i>										1	1	2.5
<i>Positive Environment</i>						1				2	3	7.5
<i>Attitude</i>		1		1						1	3	7.5

Student teachers evaluated their learning strategies which reflected the learning activities in the university classroom. It was a part of planning strategies for the lecturer to support student teacher learning. The most common learning strategies student teachers reported are self-study (57.5%), questioning (42.5%), lectures and cooperative learning (37.5%). The lowest percentage of learning strategies reported by student teachers are application, synthesis and role playing (2.5%) (Figure 4.8).

Figure 4.8: Self-evaluation of Student Teachers With Regard to Their Learning

Strategies

Student Teachers	<i>ST1</i>	<i>ST2</i>	<i>ST3</i>	<i>ST4</i>	<i>ST5</i>	<i>ST6</i>	<i>ST7</i>	<i>ST8</i>	<i>ST9</i>	<i>ST10</i>	Total	Percent %
<i>Questioning</i>	1	2	2	3		2	2		3	2	17	42.5
<i>Answering</i>	1	1	1	3		1			2	1	10	25
<i>Listening</i>		1		1		3		4			9	22.5
<i>Metacognition</i>	1		1						1		3	7.5
<i>Cooperative Learning</i>		2	3	1	2	2	2		2	1	15	37.5
<i>Lecture</i>		3	1	1	1		4	2	3		15	37.5
<i>Self-study</i>	3	3	2	4	1	1	3	1	3	2	23	57.5
<i>Discussion</i>		1			1			2		1	5	12.5

<i>Presentation</i>		1	1	1	1		1	1	1	1	8	20
<i>Practical</i>		3	2	3		1		3	1	1	14	35
<i>Application</i>		1									1	2.5
<i>Analysis</i>	2	2		1		4	1				10	25
<i>Synthesis</i>				1							1	2.5
<i>Observation</i>	1			1		1					3	7.5
<i>Role playing</i>								1			1	2.5

Student teachers were encouraged to connect and evaluate whether their learning strategies led to their success in learning. Most student teachers (95%) said that the strategies were appropriate and they were successful in their learning through those strategies. Two student teachers (ST4, ST6) reported that the strategies were appropriate but they did not learn them to a high standard. They noted they needed to develop and practice more, especially the skills of questioning. The details are shown in Figure 4.9. This data reflect that the metacognition of student teachers showed thinking, feeling and learning were present and supported better inquiry learning (Ormrod 1998, pp.348 – 349; Johnson 1999, p.347).

Figure 4.9: Self-evaluation of Student Teachers Focusing on the Appropriateness of Their Learning Strategies

Student Teachers	<i>ST1</i>	<i>ST2</i>	<i>ST3</i>	<i>ST4</i>	<i>ST5</i>	<i>ST6</i>	<i>ST7</i>	<i>ST8</i>	<i>ST9</i>	<i>ST10</i>	Total	Percent
Detail												%
<i>Appropriate</i>	4	4	4	3	4	3	4	4	4	4	38	95

Student teachers were asked to focus on skills that they believed they were good at in the subject. The results are shown that cooperative learning (40%), questioning (30%) and thinking process (20%) are skills that they feel good at and confident about. The details of their responses are shown in Figure 4.10. Specifically student teachers responses about their skills noted:

'Following thinking process and understanding the classroom activities led me to good thinking process.'

'Cooperation, discussion and attention in the classroom are the skills which I am better at.'

'Group working triggered my thinking process development.'

'My questioning is not the best, but it is better than other skills. I don't like to speak and I cannot give good answers. So questioning is the best.'

'... self-confidence to think, speak and discuss. I evaluated that questioning is the skill which I developed most and like it the best.'

Figure 4.10: Self-evaluation of Students Teacher on Skills

Student Teachers Skills	ST1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9	ST10	Total	Percent %
Questioning	1	2	2	1			1	1	3	1	12	30
Answering				1				1			2	5
Listening						1		4			5	12.5
Thinking process	1	1		1		2	2		1		8	20
Metacognition	1									1	2	5
Cooperative learning	1	1	1		4	1	3	3		2	16	40
Discussion	2	2								1	5	12.5
Presentation			1		1	1			1	3	7	17.5
Practical (Teaching)									2	1	3	7.5
Application	1	2	1			1					5	12.5
Observation								1			1	2.5
Leadership	1				1						2	5
Planning	1										1	2.5

In responding to the question about areas for improvement, student teachers think that they can improve their thinking process (47.5%), self-confidence (42.5%) presentation (32.5%), questioning (17.5%), teaching skills (17.5%) and they are confident about developing those skills. These responses show that student teachers believe that thinking and learning process can be improved by practice (de Bono1994, p.1; Ruggiero1988, p. 2). This data is shown in Figure 4.11.

Figure 4.11: Self - evaluation of Student Teachers on What They Think They Can Improve

Student Teachers Skills	ST1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9	ST10	Total	Percent %
Questioning			1			2			1	3	7	17.5
Answering				1			2		1	2	6	15
Listening										1	1	2.5
Thinking process	1	2	2	1	3	2	2	2	2	2	19	47.5
Metacognition		1			1						2	5
Cooperative learning					3	1					4	10
Self-study		1		1							2	5
Discussion					1			2			3	7.5
Presentation	2	1	1	1	2	1	2		3		13	32.5
Practical (Teaching skills)	1	3	1					1		1	7	17.5
Application	1		1								2	5
Analysis			1								1	2.5
Synthesis	1										1	2.5
Observation								1			1	2.5
Discipline										1	1	2.5
Self-confidence	2	1	4		1	2	1	3	2	1	17	42.5

For the question, *What else do you need to do to improve yourself?*, student teachers answered that they need to improve thinking process (35%), self-confidence (35%), presentation (22.5%) and questioning (17.5%) (Figure 4.12). This analysis shows that student teachers are aware of their learning and thinking developing as an essential feature of learning to be a teacher. This is an essential requirement for good teacher development and is supported by Calderhead and Shorrock (1997, p.15), Lang et al (1995, p.5).

Figure 4.12: Self-evaluation of Student Teachers on the Skills They Need to Improve

Students Teachers Skills	ST1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9	ST10	Total	Percent %
Questioning			1		1	2			2	1	7	17.5
Answering					1		1				2	5
Listening						1					1	2.5
Thinking process	1		2		3	2	2	1	2	1	14	35
Metacognition		1		1							2	5
Cooperative learning	1					1					2	5
Self-study	3		1				1				5	12.5
Discussion			1				1	1			3	7.5
Presentation		1		1	3	2		2			9	22.5
Practical (Teaching) Application		3		1						1	5	12.5
Analysis			1			1					2	5
Self-confidence				3	1	2	2	1	3	1	14	35

Some student teachers comment on their self-evaluation. The comments are as follows:

'Learning in this course is fun. I like it very much. I am not bored because the activities make me know and understand what I have learned and have a lot of fun.'

'Learning in this course helps me get the concepts of teaching. Moreover, I practise skills. I learn to apply knowledge to teaching that I plan. I develop thinking process continuously. It is like I walk on the step of the good life.'

'From learning this subject, I got experiences, especially techniques of learning activities. They are fun. I am not stressed.'

'Activities in the classroom help me to learn a lot. I develop myself so much. I am self-confident to present in front of the class. However, I need to develop more.'

'Learning in the course makes me self-confident. I practise speaking, questioning and answering. I am aware of questioning and answering.'

The reflection shows student teachers learning and their concern for understanding their developing learning through this type of transformation experience (Kolb 1984, p.36; Moon 1999, pp. 116, 135).

Learning log

There were sixteen weeks of teaching and learning in the General Methods of Teaching course. Each student teacher recorded in a learning log every week after class. They thought back and wrote what happened in the university classroom, how they felt and what they had learned. They reflected on their experience, thinking about the past, looked at the present and planned for the future. Student teachers were able to practise reflecting on their thinking through writing a learning log. It was valuable in nurturing a learning community to enhance their thinking process. Data analysis of the learning logs was organized around the themes which linked to the theoretical framework. These are the key themes: student teacher attitudes,

questioning skill, awareness and inclusion of critical thinking, creative thinking, and having a learning framework. The analysis of the learning logs for the ten student teachers who were participants is shown on Figure 4.13.

Developing a learning framework is ranked the highest. Student teachers said they had learned to develop thinking process. According to Bloom's system, knowledge, comprehension, application, analysis, synthesis and evaluation are part of the learning framework. The Six Thinking Hats and cooperative learning can also be parts of a learning framework. Student teachers said they learned with and from each other. Moreover, group process was very important to promote learning process. They were very happy in the university classroom learning. This supports claims by Bloom 1956; de Bono 1987; de Bono 1994; Johnson and Johnson 1994, that group and cooperative working, talking and thinking about new concepts assists individual learning.

Student teachers' attitudes can be identified in the student teachers' learning logs. In the beginning, some student teachers were a little bit stressed and uncomfortable in the learning activities. After two weeks, they felt better and relaxed. Reflection from their learning log has shown that the activities were fun and challenging. They were excited in learning and in practising questioning. Ten student teachers said they were so happy and self-confident to answer and ask questions. They felt very good about questioning and were aware of the importance of asking questions. In addition, they felt they loved the teaching profession and were proud to be a teacher.

Student teachers, writing in their learning logs, showed that the university classroom climate is highly valued. It was supportive and warm. It enhanced active learning and thinking process. Questioning skill development can be detected from the questions written in student teachers' learning log. The questions were concerned with what happened in the classroom. They practised answering and questioning. They learned to set questions. Sometimes they themselves asked and answered questions in the learning log. Planning for questioning and asking questions helped them understand the ways and steps to ask questions. Some student teachers can evaluate questioning and understand what a good question is. These findings are consistent with Wilson and Wing- Jan 1993; Lang et al 1995; Myers 1996, p.131; Lord 1997; p.222.

Awareness of the need for the inclusion of critical thinking is a part of reporting in learning log. Student teachers have learned to observe, analyse and solve the problem. They said they could plan and think systematically. Questioning helped them to think critically. Student teachers were confident to think and make a decision. The details from learning log show the metacognition and critical thinking of student teachers is developing (Eggen and Kauchak 1996).

In the course, awareness of the inclusion of critical and creative thinking were other things that were fostered in the university classroom. Two student teachers did not think that they increased their creative thinking. Eight student teachers wrote in their learning logs that concept mapping required creativity. This was a strategy used to promote creative and critical thinking. Moreover, some student teachers reflected that they were creative when they answered and asked questions. They have learned to create a new way of learning (Figure 4.13).

Figure 4.13: Summary of the Reflection of Thinking of Student Teachers from Learning Log

Student Teachers	<i>ST1</i>	<i>ST2</i>	<i>ST3</i>	<i>ST4</i>	<i>ST5</i>	<i>ST6</i>	<i>ST7</i>	<i>ST8</i>	<i>ST9</i>	<i>ST10</i>	Total	Percent %
Themes												
<i>Student teacher attitudes</i>	5	11	19	11	20	11	5	15	7	19	123	26.06
<i>Questioning skills</i>	8	7	11	12	7	9	4	6	5	13	82	17.37
<i>Awareness inclusion of critical thinking</i>	7	12	9	11	10	9	2	5	1	8	74	15.68
<i>Awareness inclusion of creative thinking</i>		3	5		1	1	2	1	1	1	15	3.18
<i>Learning framework</i>	10	22	31	16	17	22	9	10	17	24	178	37.71

Further reporting in learning logs revealed that student teacher thinking could be sorted in response to a number of key themes: questioning, learning, Bloom's Taxonomy, Six Thinking Hats, their attitudes to the General Methods of Teaching

class. Some examples of the bundling under each theme are reported below in Figure 4.14.

Figure 4.14: Reporting of Student Teachers from the Learning Log

Themes	Reporting of student teachers
Questioning	<i>'Questioning is a process of learning and good thinking. It helps teachers explain directly.'</i>
	<i>'... Asking questioning is better than just sitting and listening to lecture.'</i>
	<i>'Good questions help teaching. It is not boring. It is always exciting, children inquire to think and develop themselves.'</i>
	<i>'... When university lecturer asked me some questions. I can answer, I am so proud. It develop thinking process and skills in presentation. I understand student-centered approach. I always have fun when I learn in this subject.'</i>
	<i>'Changing the roles in asking and answering questions is very fun. I am afraid of risking making questioning and answering.'</i>
	<i>' Matching questioning and answering are very fun.'</i>
Learning	<i>'At the beginning student teachers were hesitant to answer questions, but now we compete with each other to answer questions.'</i>
	<i>'I can learn what good and comfortable learning atmosphere is like. I don't have to read about it in the textbook. Everything is just right.'</i>
	<i>'... Understand myself and understand teacher's work.'</i>
Bloom's Taxonomy	<i>'Today learning and teaching enable us to get knowledge practice thinking and imagination. Moreover, I practice to analyse questions too. The class is so diverse. That is why this class is not boring.'</i>
	<i>'... Learning log is a way of reflecting my thinking.'</i>
	<i>'... Writing learning log made me understand myself and know what my weakness is.'</i>

	<i>'Most importantly, this course is like a self-development course. Learning the subject, it develop our thinking. It is useful for emotional, social, physical, cognition and moral. In addition, I learn how to learn well, how to be a good person, and how to be happy.'</i>
	<i>'Model of teaching that the university lecturer taught us is the best. I can apply it to my job when I am a teacher. Activities in the classroom helped us to better understand the meaning of learner-centered.'</i>
Six Thinking Hats	<i>'I try to use Six Thinking Hats assist me to set questions too. It is easy to questions and there are objectives to ask questions.'</i>
Attitudes	<i>'Everyone looks forward to learning on Thursday.' (On Thursday student teachers have to attend the General Methods of Teaching class.) 'On the first day of the course, I need grade A. Today grade is not the most important thing. I hope to make use of the knowledge from this class and apply it to my work in my future. This is fine for me.'</i>
The university classroom	<i>' Everyone in the class smiles.'</i>

Lecturer's Journal

The learning activities in the university classroom were recorded by the lecturer in a journal after each class finished. Writing the journal assisted the lecturer to plan and develop teaching as well. Furthermore, it was a way to enhance thinking and learning through a formal reflection process. Analysis of the lecturer's journal identified key statements about practice in the writing. This analysis involved sorting and bundling these and then labelling the key themes of reflection which emerged. These themes were: teacher education attitudes, questioning. The lecturer's journal indicates what the lecturer learned within the learning framework also, for example about Bloom's higher order thinking, cooperative learning and the Six Thinking Hats.

At the beginning of the implementation of the action research cycle, which was the teaching in the General Methods of Teaching course, the lecturer felt uncomfortable to facilitate learning activities especially questioning. Gradually the lecturer felt better and happy to teach. Confidence in ability to facilitate student teachers' learning became stronger. Some activities were successful. The journal shows that the lecturer was satisfied: keen to be an effective university lecturer. Reflection on teaching in the journal shows learning to be a good lecturer, in this case as a university lecturer facilitating student teacher learning, is complex, gradual and enriched through an action research approach to reflection on practice (Reid 1997; Wilson 2002). A summary of these points is shown in figure 4.15.

Figure 4.15: Summary of the Reflection of Thinking of Lecturer from Journal

<i>Themes</i>	<i>Number</i>	<i>Percent %</i>
<i>University lecturer attitudes</i>	21	26.92
<i>Questioning skills</i>	18	23.07
<i>Awareness inclusion of critical thinking</i>	11	14.10
<i>Awareness inclusion of creative thinking</i>	4	5.12
<i>Learning framework</i>	24	30.76

Group interview

At the end of the General Methods of Teaching class the lecturer prepared and conducted a two hour semi-structured group interview with the ten randomly selected student teachers from the class. The group interview was facilitated by the lecturer. Student teachers answered questions and engaged in group discussion about their feeling, thinking, questioning and learning in the course. The following questions helped guide the interview.

- How often did you use questions in your class?
- How did you feel when the lecturer asked questions?
- How do you feel when you must ask a question?
- How did you develop appropriate questions?
- What did you learn from questioning?
- What problems did you have in class activities?
- How did you solve the problems?
- How do you understand your ability for framing questions?
 - before class activities
 - after class activities
- What, if anything, have you learned from this work?
- How did the climate of the university classroom support or hinder your learning?

The discussion in the interview was revealing. Student teacher responses were detailed. All the student teachers contributed to the discussion and a summary of the collation of their responses and views appears below (Figure 4.16).

Figure 4.16: Summary of Group Interviews of Student Teachers

<i>Questions</i>	<i>Responses</i>	<i>Number (Student teachers)</i>
1. How often did you use questions in your class?	• Average	5
	• Very often	5
2. How did you feel when the lecturer asked questions?	• Excited	8
	• Nothing	1
	• Confused / puzzled'	1
3. How do you feel when you must ask a question?	• Enthusiastic / eager	5
	• Excited	1
	• Stressed	2
	• Not liked	2
4. How did you develop appropriate questions?	• By focusing on content and analysis	5
	• By using cooperative learning	2
	• I had trouble.	1
	• By asking questions about what I need to know	1
	• By analysing the person who answers the question	1
5. What did you learn from questioning?	• Cognition, how to develop thinking process.	9
	• Awareness of the importance questioning	1

6. What problems did you have in class activities?	<ul style="list-style-type: none"> • Not self-confidence • Lack creative thinking 	8 2
7. How did you solve the problems?	<ul style="list-style-type: none"> • By self-practice • By using cooperative learning 	2 8
8. How do you understand your ability for framing questions?	<ul style="list-style-type: none"> • Before class activities - Weak / Poor • After class activities - Good and self confidence but need to develop more - Excellent 	10 9 1
9. What, if anything, have you learned from this work?	<ul style="list-style-type: none"> • Cooperative learning • Thinking process • Cognition • Questioning 	6 5 5 4
10. How did the climate of the university classroom support or hinder your learning	<ul style="list-style-type: none"> • Excellent / friendly / supportive /relaxing /active / conducive to learning 	10

Discussion of group interview responses

The transcript was analysed again by bundling, sorting responses and identifying themes which emerged in those responses. The qualitative analysis further informed the quantitative summary and indicated a number of evident trends about questioning learning and this was again related to the concepts developed by Bloom (1956) and de Bono (1987). The procedures of learning encouraged student teachers to learn to think, understand content and put theories into practice (Eggen and Kauchak 1996;

Roe 2000a; Pappas and Tepe 2002). However, student teachers also were aware of developing themselves, especially thinking skills, questioning, teaching skills and building self-confidence. They have learned in a positive environment. They asserted that they felt good in participating, expressing their feeling and thinking.

Figure 4.17 Illustrates Student Teachers Thinking Key Issues

<i>Themes</i>	<i>Comments of student teachers</i>
Questioning	<i>'Questioning must start from simple questions to high level questions.'</i>
Learning	<i>'I do things more systematically as I have to think and set priorities.'</i>
	<i>'I learned that getting a hands-on experience made me learn more. Now I know that I have to pay more attention to the lessons and review them regular; otherwise, I will learn nothing.'</i>
	<i>'Learning log made me know my past and improve myself in the future.'</i>
Bloom's Taxonomy	<i>'Activity enhance my thinking.'</i>
	<i>'We could get more content and learn to be more emotional.'</i>
Attitudes	<i>'...good relationship with other'</i>
	<i>'I feel comfortable and happy when I learn with university lecturer.'</i>
	<i>'...I smiled happily. I have a lot of fun.'</i>
	<i>' University lecturer is my best friend. She is friendly and I can trust her on everything.'</i>
The university classroom	<i>'...opportunity to show opinions....'</i>
	<i>'Classroom climate is supportive.</i> <i>Obviously, learning in this course makes me and my friends always smile.</i> <i>It encourages us to learn. All activities are fun.'</i>

Reflection

Facilitating questioning skills of student teachers through action research was a means of increasing and improving knowledge about teaching and learning. It supported learning to assist student teachers to ask questions. Student teachers have learned the principles and concept of teaching. They can explain and discuss in the learning and in the university classroom. Furthermore, they can apply the principles of teaching in the demonstration teaching in the university classroom. They have learned to solve the problems and construct new knowledge for themselves. In the new knowledge of being teacher, analysis and synthesis are the processes which enabled student teachers' new learning to occur. Student teachers planned and chose the lessons for teaching. They analyzed the lesson (content) and created the procedure and wrote in the lesson plan. While they were teaching they reflected; displaying thinking in action. Evaluation was a way that student teachers learned to judge and critique their friends' practice and their own learning and teaching.

Trialing and implementing their teaching ideas and questioning skills in the university classroom demonstrated and reflected the understanding of learning that the lecturer facilitated for student teachers' questioning, answering and cognition (Margan and Saxton 1991; Wilen 1991; Fogarty and Bellance 1991; Wilson and Wing-Jan 1993; Wilks 1995; Lang et al 1995; Eggen and Kauchak 1996). Then student teachers absorbed learning and applied the thinking process of Bloom. It was a cycle of learning and thinking development. The lecturer has learned to facilitate questioning skills and student teachers have learned to be teachers. Summarising learning from

implementing the first cycle is described below as a series of propositions which will be further tested, developed and clarified in the second cycle.

Activities

- Cooperative learning is very powerful for encouraging learning and thinking processes.
- ‘Think- pair-share’ is a group support activity. It is an activity which supports the development of the thinking process.
- Six Thinking Hats is an excellent tool. It is easy to focus thinking and questioning using Six Thinking Hats.
- Discussion and presentation are helpful for enhancing student teachers self esteem and critical thinking.
- Practical teaching of student teachers in the classroom is a way to understand both theories and practices.
- Sharing the learning log is a good idea to support learning with and from each other and to gather comments from peers
- Action learning is excellent for learning in the real situations.
- Activities need to be challenging and creative. Student teachers must use many strategies in their teaching to facilitate school students’ learning.

University classroom climate

- Must be supportive and safe
- The lecturer must be friendly and approachable with student teachers.
- Planning university lessons should be careful, detailed and respond to student teachers' needs and abilities.
- Positive comments help student teachers' self-confidence.
- A positive environment is important for the learning of student teachers.
- Positive thinking in teaching is important for good planning and implementation.

Questioning

- Should begin with simple questions to develop higher order thinking questions
- Wait time is very important for student teachers to think about questions before answering.
- Asking for volunteers to demonstrate questions encourage other to have ago
- Peer interviewing is an activity to assist student teachers questioning.

Planning for the Stage 3 (Cycle 2)

Learning from Stage 1 (Cycle 1) such as planning activities, university classroom climate and questioning was considered and formed the basis for the planning for the second cycle. Implementing teaching in the "Professional Experience 2" subject is the Stage 3 (Cycle 2) of the action research project. There are sixteen weeks of teaching

and learning in the course. Activities were based on lesson plans for developing the deep understanding of questioning skills. The pedagogical needs of the learner are the development of teacher skills. It is the capacity to learn and apply theoretical knowledge in a professional field which is critical (Brockbank and McGill 1998, p.73; Reeve 1999, p.73). Some weeks student teachers must set lesson plans and then teach students in schools in the following semester. Student teachers need to train for teaching and questioning in the real classroom situation.

Activities emphasize cooperative learning, group process and sharing experience. Presentation, discussion, practical teaching, questioning are the processes that are applied continuously. Sharing and commenting on learning logs is considered more deeply and frequently. It is very important to ask a question and for student teachers to answer in their learning logs. It is a strategy to enable student teachers to practise questioning. Six Thinking Hats is regarded again. Student teachers focus their questioning around the perspectives of the Six Hats. In addition, student teachers practise more questioning skills through activities in the university classroom, group teaching and teaching practicum in school classroom. The questions need to be set at higher levels and based on deeper inquiry than in the first stage because in the first stage, student teachers most set frequently questions which reflected 'knowledge' and 'comprehension' thinking (Thomas and Albee 1998, p.1; Ormrod 1998, p. 366; Snowman and Biehler 2000, p.349).

To assist student teachers' questioning at high levels requires careful planning to ensure that teaching and learning encourage a deep approach. Self and group

assessment are effective in learning processes and are incorporated into Cycle 2 also. Student teachers have learned to evaluate and take suggestions from their peers that assist them to reflect on and improve the thinking process. Systematic observation is considered in the third stage. It involves observing learning behavior and questioning skills both in the university and school classroom. Awareness that a positive environment makes good attitudes which effect learning processes is important and teaching must be supportive and friendly (Wilson and Wing – Jan 1993; Tauber 1995, p.28; Lang et al 1995; Purdie and Smith 1999).

Finally, the teaching in this action research project is designed to enhance learning effectiveness. The design of the project is to help student teachers in achieving the goal. It is carefully planned for practical teaching. Systematically planning the project supports subjects that are designed to bring student teachers face to face with the real situation of teaching and the application of questioning which would enable them to relate academic work to practice and encourage a deeper professional learning.

Action learning for both the lecturer and student teachers is reported as part of reviewing approaches in the next cycle. The new ideas for change are developed from this first cycle implemented in the Professional Experience 2 subject. The student teachers are taught to set questions in the university classroom and to apply these in the school classroom. Student teachers present and analyse questions through action learning. The learning activities are focused on developing student-centred pedagogy. Furthermore, student teachers learn in a positive environment which support thinking process development. The reporting of the next Chapter explores the

learning approaches developed to promote student teachers to more deeply understand questioning and develop higher order thinking. Hence, the reflection of Stage 1 (Cycle 1) leads to the change in teaching in Stage 3 (Cycle 2) to assist student teachers' questioning.

Specific Issues Relating to Thai Education

In the phase where student teachers are getting started with questioning the data show that they have learned questioning, and had experiences in creative and critical thinking. Reflection in the university classroom presents a student-centred approach and the strategies to develop metacognition (Wilson and Wing-Jan 1993, Lang et al 1995, McInerney and McInerney 1998, Office of the National Education Commission 2000a, and Phifer 2002) These strategies were developed through the learning log, questioning, self evaluation and negotiating learning. Student teachers were trained in the humanist classroom as discussed by Langer (1992), Tauber (1995), and Moore (1998) and in keeping with the practices of communities of enquiry and other constructivist approaches (Moon 1999, and Pappas and Tepe 2002). This result relates to education reform in Thailand. Because of the Thai Education Act the lecturers and teachers in the university and school must change their teaching style from teacher-centred to student-centred approaches. This is quite different from what they have experienced as young school students themselves and also to the way in which they have been trained to teach. Teachers now need to promote creative and critical thinking of learners. The role of teachers must therefore change too and this goes against the professional, school and social cultures in which they work. They

need to plan learning activities through student centred approaches. Facilitating the questioning skills of student teachers is an example of study which support the intentions of the Act. The student teachers must have opportunities to ask and answer questions both in their teacher education programs and as teachers in school classrooms.

Traditionally, Thai students have not been encouraged to think for themselves, ask and answers questions. They are shy and this shyness and reserved manner is encouraged by parents and the society and is highly valued in young boys and girls. Students, therefore are not confident to ask questions or to express and discuss their ideas. Moreover, Thai culture the children must respect the adult and for Thais this means being silent and listening to all that their elders say without opinion or challenge. Good children need to behave and do not discuss or interrupt with another person, especially an adult. This is the reason that why children do not like to ask questions. Hence questioning and thinking development are not happening freely in the classroom. Now the policies of Thai government involve enhancing students' creative and critical thinking and so there is a conflict between the cultural expectations and the educational imperative. This will be an important challenge for Thai education over the next decade or so and is a further argument for why learning how to ask questions appropriately, think critically as well as work respectfully is powerful in the university and school classroom.

This research show changing in teaching approaches to facilitate student teachers questioning and thinking skills is a model of teaching through an inquiry approach

based on action learning and research. It was difficult to establish these practices when the university classroom started in the research. There are some obstacles to open enquiry questioning such as the previous learning experiences of student teachers in teacher-centred approach as well as student teachers' attitudes and cultural values and practices in questioning and thinking all of which were developed in Thai culture and learning experiences in traditional classrooms. Finally, after a semester of learning in the university classroom, student teachers developed questioning and thinking skills. However, they need to develop more.

Reflection of cycle 1, there are the new plans to encourage student teachers higher order thinking and planning learning activities to enhance higher level questions as well. The lesson planning was started in the new semester.

Chapter 5

Enhancing Student Teachers' Higher Order Thinking

'..... The questioning is important. I feel that my questioning is not the same. The first time my questions were mostly knowledge seeking and comprehension questions.

Now my questions are at a higher level. We must think more to answer.

(A student teacher reflecting her thinking)

The description of the research in this chapter follows directly from the work in Stage1 (Cycle 1). To develop the program for this second cycle of the research and its data gathering, the strengths and weaknesses of the learning activities from the last cycle, along with the tentative findings from the initial data analysis, were considered. Then the lecturer set about planning and developing the curriculum details for the implementation of the subject in the sequence of teacher education study which was the Professional Experience 2 course. This was presented in Stage 3 (Cycle 2) of the research.

A wide range of activities were designed specifically to support and promote student teacher questioning and thinking development. This design process involved

incorporating cooperative learning, Six Thinking Hats strategies and concept mapping as well. Student teachers practised developing, answering and listening to a wide range of questions through their own learning activities in the university. This experience was then used as a basis for them to refer to as they each set about developing lesson and teaching plans including careful questioning for their students in their practice teaching school classroom. During this stage of the research student teachers analysed and evaluated the depth and quality of their questions.

Again, student teachers were invited to reflect on their own learning and complete the form which evaluated their own learning outcomes. This was then discussed in the university classroom also. It was expected that through the university class of the Professional Experience 2 subject student teachers would develop a wide range of learning activities, strengthen their thinking processes and become more aware and focused on deeper questioning skills for themselves, but also in their lesson plans for practice teaching in school.

Early classes in the university classroom were designed to review teaching skills, lesson planning and demonstration teaching knowledge and skills developed in the previous semester. The student teachers were encouraged to regularly reflect on their thinking and questioning in their learning log. The next activities of Professional Experience 2 course, were those where the student teachers were required to teach and observe in the school classroom and then come back to the university to reflect on and discuss their learning. This time the University teaching arrangements and style in this course was changed so that student teachers were encouraged to also teach in the school classroom. This had not been an expectation in previous years. Moreover,

student teachers had the opportunity to observe both their peers and school teachers teaching. The learning process and reflection of student teachers was also recorded in the lecturer's journal. It was anticipated that the pedagogical focus and development of the Professional Experience 2 subject might help student teachers to enhance higher order thinking and utilize this awareness in the real situation of the school.

Reporting Stage 3 (Cycle 2)

Following the General Methods of Teaching class in Stage1 (Cycle 1) of this research, the Professional Experience 2 subject was implemented in the first semester of the 2003 academic year. The Professional Experience 2 subject was designed to supervise teaching and the application of instructional materials. Student teachers practised individual and small group teaching and learned about classroom management. As well, this course provided student teachers with the opportunity to further develop the design of their lesson plans. The specific aims of the subject were:

- To develop lesson plans and practise teaching;
- To observe educational systems in schools;
- To observe activities and methods of instruction in various subjects in the school classroom;
- To learn and experience the duties of the teacher;
- To promote positive attitude toward the teacher profession;
- To readiness of pre-service teachers.

There were sixteen weeks of implementation in the subject also. The lecturer set the lesson plans for University teaching and these details are shown in Appendix D. Data collection for this Stage 3 (Cycle 2) was recorded systematically, and all work of student teachers and the lecturer was considered and analyzed again as in the first cycle. This included work documents, lesson plans, self-evaluation, student teacher learning logs, the lecturer's journal and the transcripts of group interviews.

Reflection on the implementation of the research project focused on teaching and learning approaches for the development of the teaching of questioning. The teaching strategies applied built on those experienced in Stage 1 (Cycle 1). Data were gathered from June-September, 2003. The data gathered were analyzed by identifying the questions student teachers asked, then bundling them according to two thinking models- 'Bloom's Taxonomy' and 'de Bono's Six Thinking Hats'. Student teachers used their learning experience in Stage 1 (Cycle 1) to stimulate further extension and analysis of their thinking, action and questioning. Additionally, they used Bloom and de Bono in planning and designing lesson plans and in their teaching in the university and school classroom. This process enabled the final analysis and generation of findings about how the student teachers think, interact and question.

University classroom activities

The activities in the university classroom were used to develop the higher order thinking and questioning skills of student teachers. Student teachers reviewed their thinking and their interaction with questioning. Questioning was involved and

integrated in the learning approaches of the university classroom. Student teachers had learned from and analyzed their own questioning. Some specific university teaching activities focused this thinking and the analysis of their questions. Student teachers were taught to set questions and develop questions and questioning skills. The frequency of different types of questions evident as student teachers applied and developed questions in the university classroom is shown in Figure 5.1.

Figure 5.1: Frequency of Questioning of Student Teachers in Classroom

Activities Which Reflected Bloom's Taxonomy Thinking (Cycle 2)

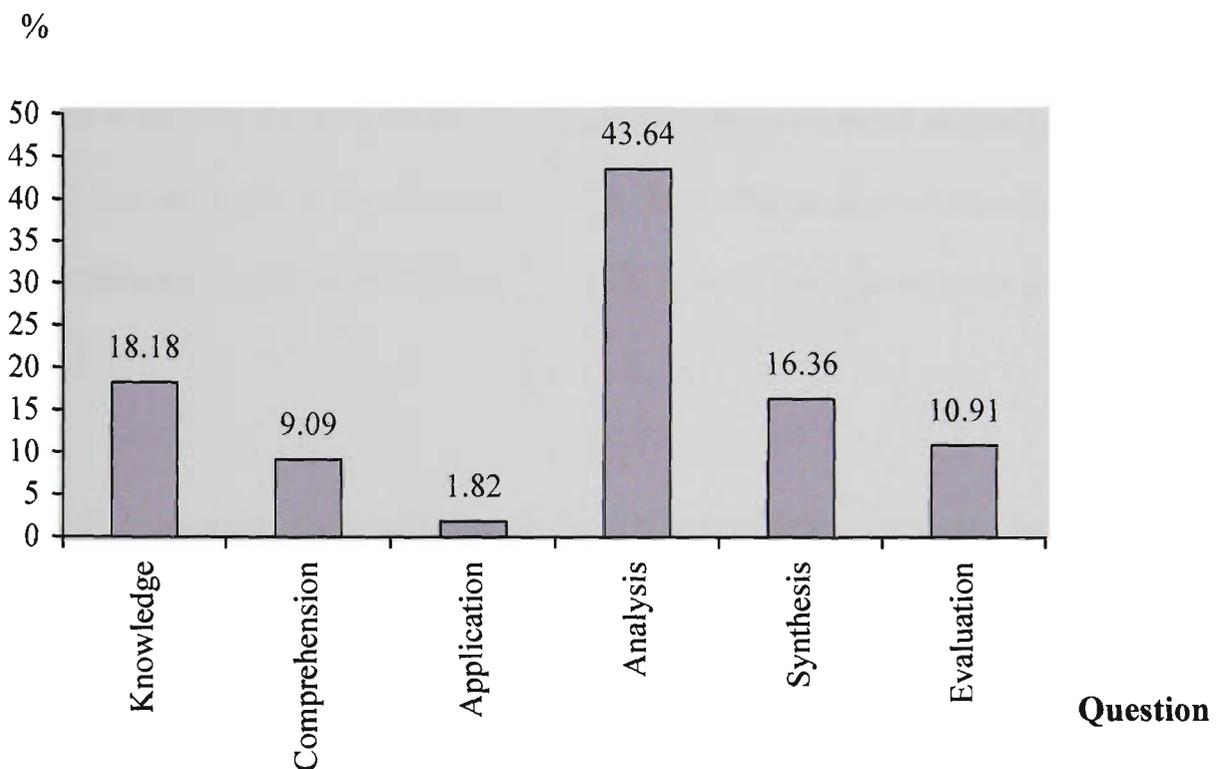
Student Teachers	<i>ST1</i>	<i>ST2</i>	<i>ST3</i>	<i>ST4</i>	<i>ST5</i>	Total	Percent %
Categories of Questions							
<i>Knowledge</i>	4	2	2	1	1	10	18.18
<i>Comprehension</i>		3		1	1	5	9.09
<i>Application</i>				1		1	1.82
<i>Analysis</i>	2	5	7	5	5	24	43.64
<i>Synthesis</i>	3	1	1	1	3	9	16.36
<i>Evaluation</i>	2		1	2	1	6	10.91
Total	11	11	11	11	11	55	100

The questions which focus on analysis are the most commonly reported. The second most common are knowledge questions and the third are those questions which focused on synthesis thinking. Some student teachers set analysis questions (ST2, ST3, ST4 and ST5). One student teacher's questions were typically knowledge seeking questions (ST1). There were no questions which could be reported the not

clear category as in Cycle 1. The category of not clear or 'other' included the questions that were not related to the situation, the questions that did not fit any categories, and sentence that were not questions. The details of the summary of questioning in university classroom activities are shown in Figure 5.2.

Figure 5.2: Summary of Questioning of Student Teachers in Classroom

Activities In Relation to Bloom's Taxonomy (Cycle 2)



Six Thinking Hats

The Six Thinking Hats were used as a strategy again in the second cycle to assist students in developing several different perspectives and to assist in focusing their questioning. Student teachers watched a video of two student teachers teaching as part of their work in the first subject last semester, ie the General Methods of

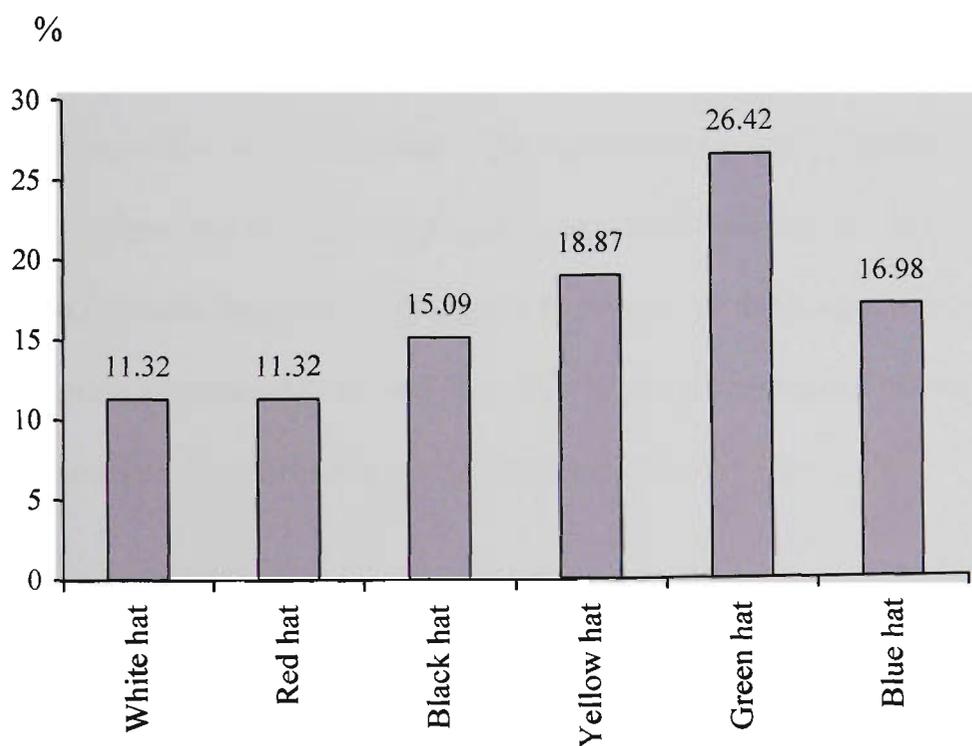
Teaching class (Cycle 1). These two student teachers had volunteered to demonstrate their teaching. Then the other student teachers set at least ten questions on these demonstration teaching skills by using the Six Thinking Hats. They focused their thinking on the perspectives of the six colors (de Bono 1987). They were to reflect white hat, red hat, black hat, yellow hat, green hat and blue hat thinking. Each student teacher set five questions after watching the first student teacher's demonstration. Then they were required to set at least five questions again after watching the video of the second student teacher. Hence, there were at least ten questions responding to the framework of the Six Thinking Hats. These questions were recorded on cards and they were then analysed at the conclusion of the class. The number of questions which emphasised each type of thinking hat asked by each student teacher is shown in Figure 5.3.

Figure 5.3: Frequency of Questioning on Six Thinking Hats of Student Teachers in Classroom Activities (Cycle 2)

Student Teacher	<i>ST1</i>	<i>ST2</i>	<i>ST3</i>	<i>ST4</i>	<i>ST5</i>	Total	Percent %
Six Thinking Hats							
<i>White hat</i>		1	1	1	3	6	11.32
<i>Red hat</i>	2	1	1	1	1	6	11.32
<i>Black hat</i>	2	2	1	2	1	8	15.09
<i>Yellow hat</i>	2	2	2	2	2	10	18.87
<i>Green hat</i>	3	2	4	2	3	14	26.42
<i>Blue Hat</i>	2	2	2	2	1	9	16.98
Total	11	10	11	10	11	53	100

The percentage of student teachers asking green hat or creative thinking questions (26.42 %) was the highest. The second highest number of questions were yellow hat or positive thinking questions (18.87 %), and the third most frequently posed questions were blue hat or organised thinking questions (16.98 %) (Figure 5.4). This was a distinctive shift from the first cycle of the research. It demonstrated that student teachers were becoming more skilled and competent at thinking creatively and critically were able to ask questions with this broader inquiry focus now that they had practiced questioning more and were more conscious of the impact and importance of more open ended questions.

Figure 5.4: Summary of Questioning on Six Thinking Hats of Student Teachers in Classroom Activities (Cycle 2)



Questions

Lesson plans

The lecturer developed fifteen lesson plans for implementation in Professional Experience 2 in Stage 3 (Cycle 2) of the research. The teaching and learning approach used many strategies which were an extension of and adapted from the Stage 1, including cooperative learning, discussion, Six Thinking Hats, presentation and demonstration teaching. Student teachers were required to write their lesson plans for teaching in the university and school classroom. Student teachers were required to set at least six questions in each lesson plan. The questions were planned and used in practice in the university before being implemented in the school classroom. Student teachers demonstrated that they had learned to set and implement a range of questions. They were careful to integrate Bloom's framework and de Bono's Six Thinking Hats into the questions they constructed for teaching. They were also aware of effective classroom questions (Dillon 1988; Wilen 1991; Wilson and Wing-Jan 1993). In this stage, fifty-three questions were analyzed from the lesson plans of five student teachers. The highest percentage of questions from student teachers was for knowledge questions (28.30%). The second highest percentage was for analysis questions (24.53%) and the third highest percentage was for comprehension questions (18.87%). The lowest percentage of questions from student teachers was for evaluation questions (3.77 %) (Figure 5.5).

**Figure 5.5: Frequency of Questioning from Lesson Plans of Student Teachers
(Cycle 2)**

Categories of Questions	<i>ST1</i>	<i>ST2</i>	<i>ST3</i>	<i>ST4</i>	<i>ST5</i>	Total	Percent %
<i>Knowledge</i>	3	7	1	3	1	15	28.30
<i>Comprehension</i>	2	2	2	2	2	10	18.87
<i>Application</i>	1	1	1	2	1	6	11.32
<i>Analysis</i>	4	3	2	1	3	13	24.53
<i>Synthesis</i>	1	2	1	2	1	7	13.21
<i>Evaluation</i>	1		1			2	3.77
Total	12	15	8	10	8	53	100

In this stage, there were no questions which were considered not clear. The details of student teacher lesson plans showed understanding and systematic planning of the questioning to be used by the student teachers in their practice teaching. Some examples of the procedure and questioning in the lesson plans of student teachers on which they reflected in the university classroom were as follows:

Student Teacher 2 (ST2)

This student teacher is an example of first setting some knowledge focused questions first. Then student teacher set comprehension, analysis, application and evaluation questions. She was aware of the feeling of her students. After she started the lesson some questions specifically showed knowledge focused questions. Below is a list of questions from this student teacher's lesson plan.

'In the last hour what did you learn?' (Knowledge question)

'Are you tired?' (Reflection/Evaluation question)

'Are you stressed?' (Reflection/Evaluation question)

'How many kinds of fruits did you hear in the song?' (Knowledge/Comprehension question)

'Look at the picture. What kind of fruit is it?' (Knowledge question)

'What does the fruit look like?' (Analysis question)

'What is its colour?' (Knowledge question)

'How does it taste?' (Knowledge question)

'Who has this kind of fruit at home?' (Comprehension/Knowledge question)

'Do you know which one is good or bad?' (Analysis question)

'How do you know?' (Comprehension/Analysis question)

'What is the benefit of fruits?' (Analysis question)

'If you didn't want to eat a fresh orange, how would you find a new way for eating it?' (Analysis/Application question)

'What have you learned so far?' (Analysis question)

'If you don't want to use oranges what else will you use?' (Application question)

Student Teacher 3 (ST3)

ST3 is an example of a student teacher who demonstrated good planning for questioning in lesson planning. The questions were interesting and integrated in the learning activities. Some questions showed creative thinking and enhancement of the thinking process. She was self-confident in demonstration teaching as well. She

asked questions slowly and waited appropriate amounts of time for answers (Dillon 1988; Margan and Saxton 1991; Wilen 1991). Class observation showed that ST3 did not address her peers, learners in the university classroom, by name in her demonstration teaching. However, her questioning was relaxed and non-threatening. Moreover, ST3 encouraged the learners to answer. In this stage she was not too shy to ask questions and was proud to be teaching. These are the questions developed and applied by ST3.

'What did you eat for breakfast this morning?' (Knowledge question)

'What do rice, eggs and milk derive from: plants or animals?'

(Comprehension/Analysis question)

'If you didn't eat rice, eggs or milk, what else could you eat?'

(Application/Comprehension/Analysis question)

'If there are no food, what would happen to you?' (Analysis/Evaluation question)

'Apart from the examples mentioned, can you give other examples of...the

relationship of human being.' (Application/Synthesis question)

Student Teacher 4 (ST4)

ST4 developed teaching skills appropriately. ST4 applied activities from the university classroom to her real situation (McGill and Beaty 1995). Some questions encouraged students' critical and creative thinking. The questions were established systematically, step by step. Starting questions were simple. Moreover, questions were clear and positive. The questions are shown as follows:

'How do you classify the following electrical appliances?' (Comprehension question)

'What are they?' (Knowledge question)

'Today is the 100th anniversary of a department store, luckily, the department store allows us to try electrical appliances for free. What would you try?'

(Analysis/Synthesis question)

'Why?' (Comprehension/Analysis question)

'What are the steps in using the appliance that you have chosen?' (Comprehension question)

'Why do you think that this picture shows the right way of using the appliance?'

(Analysis/Evaluation question)

'What is the right way of using the appliance?' (Comprehension/Application question)

'Why do we have to use the appliance appropriately?' (Analysis/Comprehension question)

'Who has experienced the danger of electrical appliance?' (Knowledge/Application question)

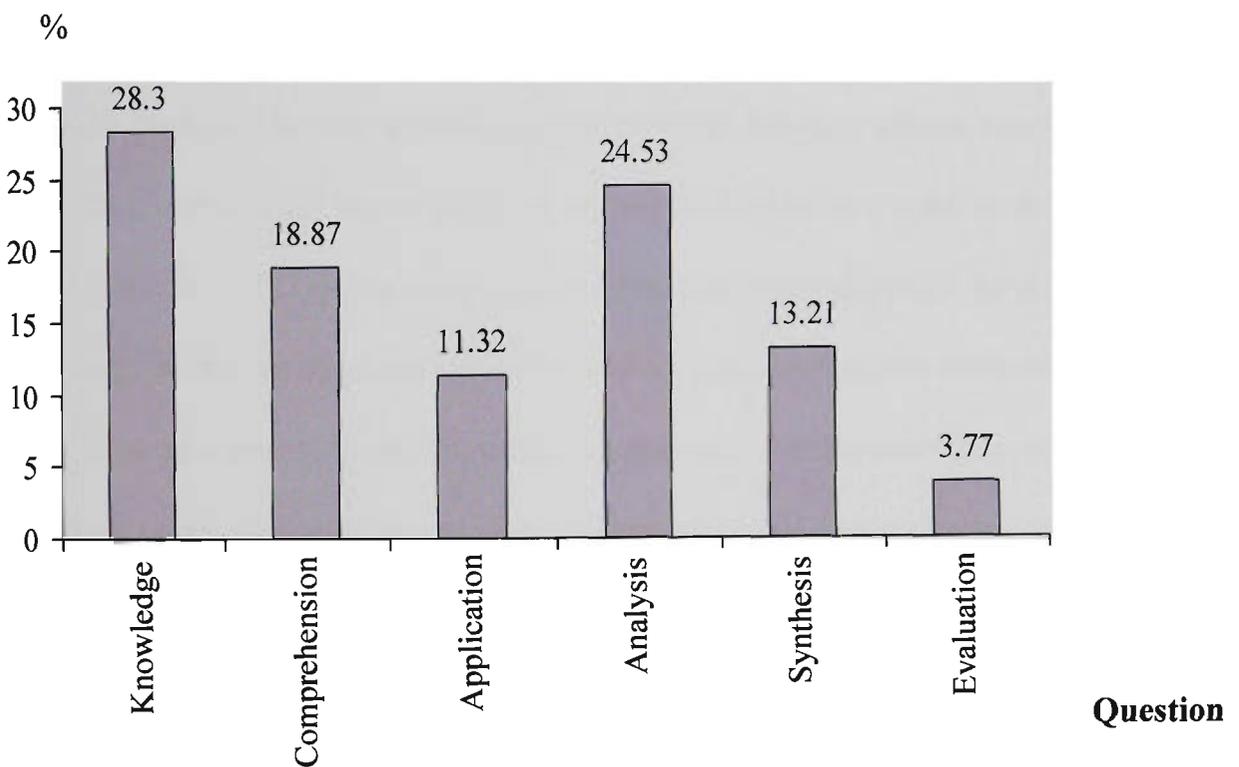
'How?' (Synthesis/Comprehension question)

The questioning of all five student teachers involved different levels of complexity (Cole and Chan 1987; Dillon 1988; Wilen 1991). This stage of the research resulted in no questions being used in the lesson plans which would belong in the 'not clear' category. Planning for lessons assisted student teachers to learn about the construction and development of effective questions. They tried to ask lower order questions first. Then they set higher order questions. Student teachers facilitated questioning in the university classroom as a way to practice what they would need to

do in the school classroom. They had learned from reflection on this practice teaching in the University with their peers about effective questions.

The results of this study have shown that student teachers set knowledge focused questions when they started developing learning activities. Some student teachers reviewed the thinking of their school students by using knowledge focused and recall questions. The details of the summary of question types are shown in Figure 5.6.

Figure 5.6: Summary of Questioning on Lesson Plans of Student Teache (Cycle 2)



Self-evaluation

Self-evaluation was a strategy which encouraged student teachers to learn to think and reflect on their strengths and weaknesses in the university and school classroom.

Each student teacher self-evaluated four times as part of the Professional Experience 2 class. Student teachers self-evaluated after class in the 4th, 7th, 10th and 15th week.

They evaluated themselves by answering seven questions. These questions are as follows:

1. What have you learned from this subject?
2. What were your learning strategies?
3. Were you successful in your learning by using those strategies?
4. What skill do you think you are good at?
5. What do you think you can improve?
6. What else do you need to do to improve yourself?
7. Others/ Comments?

The results showed that most student teachers reported that they learned teaching skills (55%), questioning, lesson planning and application of their questioning skills in real situations (20%), and to review and analyse the learning process for their development within the teaching profession (10%). Student teachers were assisted to learn to be good teachers. In addition, they felt that their development was promoted to its fullest potential and that they got the opportunity to demonstrate their teaching at university and in the school classroom. Student teachers reported that they applied the theories learned in their classroom teaching practice. A summary of the main points reported in their evaluations is shown in Figure 5.7.

Figure 5.7: Self-evaluation of Student Teachers With Respect to What They Have Learned from the Subject (Cycle 2)

Student Teachers	<i>ST1</i>	<i>ST2</i>	<i>ST3</i>	<i>ST4</i>	<i>ST5</i>	Total	Percent %
Learning							
<i>To be effective teacher</i>	1					1	5
<i>Questioning</i>	1	1			2	4	20
<i>Thinking process</i>	3					3	15
<i>Presentation</i>		1				1	5
<i>Teaching skills</i>	2	3	2	2	2	11	55
<i>Application</i>	2			2		4	20
<i>Analysis</i>	1			1		2	10
<i>Observation</i>				1		1	5
<i>Classroom management</i>		1				1	5
<i>Attitude</i>	1					1	5
<i>Lesson planning</i>		2			2	4	20
<i>Review learning process</i>			1	1		2	10

The university teaching strategies which were reported as most effective in supporting the learning of student teachers were: practical activity in the university and school classroom (55%), observation (35%) and cooperative learning (25%). These results are shown in Figure 5.8.

Figure 5.8: Self-evaluation of Student Teachers With Regard to Their Learning Strategies (Cycle 2)

Student Teachers	ST1	ST2	ST3	ST4	ST5	Total	Percent %
Learning Strategies							
<i>Practical</i>		2	3	3	3	11	55
<i>Questioning</i>		1		1		2	10
<i>Writing lesson plan</i>		1				1	5
<i>Thinking process</i>	1		1	2		4	20
<i>Cooperative learning</i>	2	1		2		5	25
<i>Discussion</i>	2			1		3	15
<i>Teaching skills</i>		1	1			2	10
<i>Application</i>	2					2	10
<i>Analysis</i>	1			1		2	10
<i>Synthesis</i>	2					2	10
<i>Observation</i>		2	1	3	1	7	35
<i>Attend the class</i>		1			2	3	15
<i>Self-study</i>		2			2	4	20

The reflection of student teacher showed that while they had appropriate learning strategies, there were some other influences on their learning. These were that a) they should be active learners and b) that they should practice more teaching, questioning and problem solving. These responses are shown in Figure 5.9.

Figure 5.9: Self-evaluation of Student Teachers Focusing on the Appropriateness of Their Learning Strategies (Cycle 2)

Student Teachers	<i>ST1</i>	<i>ST2</i>	<i>ST3</i>	<i>ST4</i>	<i>ST5</i>	Total	Percent %
Detail <i>Appropriated</i>	4	4	4	4	4	20	100

Student teachers evaluated whether their learning strategies led to their success in learning. One hundred percent of student teacher in the study stated that the learning strategies to which they were exposed were appropriate. Some student teachers reflected on their learning as follows:

'I need to review and always practice.'

'I have learned from friends' teaching. Then I applied and synthesized my own teaching.'

'Activities were designed by lecturers leading the goals. My friends and I had opportunities to present, discuss and develop skill more. These processes increased step by step.'

'Appropriate because the process made me understand more.'

'Appropriate because there are the factors of learning which we considered such as, student teachers, lecturer, materials and environment.'

'I understood my strengths and weakness.'

Student teacher evaluated and reflected on their skills. They evaluated that they were good at questioning (40%), presentation (30%) and teaching skills (25%). These skills were very powerful in supporting and facilitating learning and thinking

processes. The results are shown in Figure 5.10 and these are some reports of student teachers.

'To set questions to trigger thinking process but they still need to develop more.'

'It is not very good but I think that my questioning is fine but it needs time more.'

Figure 5.10: Self-evaluation of Student Teachers on Skills (Cycle 2)

Student Teachers	ST1	ST2	ST3	ST4	ST5	Total	Percent %
Skills							
<i>Questioning</i>	3	4			1	8	40
<i>Answering</i>		1				1	5
<i>Thinking process</i>	1			2		3	15
<i>Cooperative learning</i>				2		2	10
<i>Discussion</i>		1				1	5
<i>Presentation</i>	2	3	1			6	30
<i>Teaching skills</i>	2	1			2	5	25
<i>Lesson planning</i>					1	1	5
<i>Listening</i>		1		1		2	10
<i>Writing</i>		1				1	5
<i>Self-confidence</i>		1				1	5
<i>Attend class</i>				2		2	10

In the Stage 3 (Cycle 2) student teachers thought that they improved questioning skills (50%), teaching skills and self-confidence (20%), and classroom management (15%).

The improvement in these skills showed that student teachers had learned to be effective teachers (McGill 1995, p. 2; Pasner 2000, p.21). They were able to take responsibility for developing themselves. A summary of student teacher reflections is shown in Figure 5.11.

Figure 5.11: Self-evaluation of Student Teachers on What They Think They Can Improve (Cycle 2)

Student Teachers	<i>ST1</i>	<i>ST2</i>	<i>ST3</i>	<i>ST4</i>	<i>ST5</i>	Total	Percent %
Skills							
<i>Questioning</i>		3	1	2	4	10	50
<i>Answering</i>					1	1	5
<i>Presentation</i>			1			1	5
<i>Teaching skills</i>	3			1		4	20
<i>Application</i>				1		1	5
<i>Lesson planning</i>	1	1				2	10
<i>Problem solving</i>					1	1	5
<i>Classroom management</i>		1	1		1	3	15
<i>Personality</i>			2			2	10
<i>Self-confident</i>		1		3		4	20

The sixth question focused on the skills they needed to improve. The results showed that student teachers needed to improve questioning (50%), teaching skills (35%) and classroom management (30%) (Figure 5.12). Their evaluations showed that student teachers were aware of their development in the essential skills of being a teacher (Eggen and Kauchak 1996, Kyriacou 1998). Being a teacher meant that they must be a planner, organizer and thinker.

Figure 5.12: Self-evaluation of Student Teachers on the Skills They Need to Improve (Cycle 2)

Student Teachers	ST1	ST2	ST3	ST4	ST5	Total	Percent %
Skills							
Questioning		3	2	2	3	10	50
Answering					1	1	5
Thinking process			2	1		3	15
Presentation		1	1	1		3	15
Teaching skills	2	2	1		2	7	35
Lesson planning	1	1			1	3	15
Classroom management	1	1	1	1	2	6	30
Personality			1			1	5
Writing learning log				1	1	2	10

Some student teachers also commented on their experience of self-evaluation. Some of the comments were as follows:

'Each student teacher is developing towards high quality. It is self development. It is not necessary to compare with another student teachers' development.'

'Classroom management is a problem when I practised teaching in the school classroom. I think it is difficult. However, the experiences in the university classroom helped me to be successful in teaching in the school classroom.'

'Problem solving is a very important skill for being a teacher. Problem solving did not show the lesson plan but it is a way to apply skill to practice. I did not plan before.'

'If I practice more, I should be better at the skills needed for teaching.'

'Learning activities, teaching skill and application are necessary for professional experience to be good teacher.'

Teaching observation of student teachers in school classroom

In the Stage 3 (Cycle 2) student teachers worked in the school classroom six times. They practised experiences in the teaching. In the 8th and 9th week of university classes, student teachers went to the school and they observed teaching and learning and worked in the school classroom. They helped the school teacher in classroom management, checking exercises of school students, made some teaching materials, assisted individual students, observed the school teacher and students. Then they came back to the university and participated in seminars about their learning experiences. In the 11th, 12th, 13th and 14th of university classes, student teachers worked at the school. They worked in pairs, developed lesson plans and engaged in team teaching. They were required to develop at least six questions in their lesson plans, and each student teacher was required to ask at least three questions in his or her teaching. Each student teacher took turns to observe the team teaching of others. The details of the observation of the teaching of other student teachers in the school classroom showed that the student teachers worried about their teaching ability, especially their classroom management skills. However, they tried to teach step-by-step according to their lesson plans. Questions were used in the school classroom but often they were not appropriate. A description of the teaching practice experiences of student teachers is outlined below.

Student Teacher 3 (ST3) and Student Teacher 4 (ST4)

ST3 and ST4 worked in pairs for teaching in the school classroom. They taught Grade 2 students. There were forty-two students in their classroom. Although ST3 and ST4 tried to set group work and cooperative learning in the school classroom, it did not work. Because there were eight students in each group for the group work activities, it was too difficult to organize the learning activities because the school classroom was small to accommodate the large number of students working in groups. In addition, ST3 and ST4 did not make the objectives of group work explicit to the school students and did not build classroom discipline (Charles et al 1996). The questions that these student teachers asked were not effective (Lang et al 1995). They said after they had finished the class that...

'I forgot the questions which were set in the lesson plan. I am so excited in teaching.

It is not easy or the same as teaching in the university classroom. I am so tired.'

'Let all of us try teaching again. It challenges me to manage the classroom. I am still thinking positively about my teaching experience. Teaching experience is a learning process.'

Student Teacher 1 (ST1)

The next week ST1 and her partner worked in pairs and demonstrated teaching in the Grade 2. There were forty-two students in this room as it was the same room of ST3 and ST4. The results of reflection on the work of ST3 and ST4 were developed by ST1 and her partner. She observed learning activities and planned critically. Before

teaching ST1 and her partner discussed the teaching plan with the lecturer. She needed to take the forty-two students from the classroom to the hall of the school. She thought that this was a good way to solve the problem of classroom organization and management because the hall was the big room. She hoped that it was the best for her planned activities. ST1 adapted her classroom management strategies in response to the experiences of ST3 and ST4 that she had observed the week before. Because ST1 observed the work of ST3 and ST4, she learned that the school classroom was too small. There were forty-two students in the school classroom. It was too difficult to manage all the school students and build the learning activities. Before beginning the learning activity ST1 and her partner explained the rules of classroom. ST1 gave a nice sticker to all the school students. When the school students answered questions or behaved they got another beautiful sticker. It seemed to be fine to start but there were some problems in dividing the students into groups. ST1 used a lot of time to organize group work. Some school students played and ran around the hall. Questions were asked by ST1 but these questions were not effective. ST1 shouted questions and school students did not listen questions. Good questions were not happening in the school classroom (Wilson and Wing-Jan 1993). Although ST1 planned and designed questions very well in her lesson plan, they were not effective in the school classroom. Students were noisy and did not intend to answer questions. It was hard to apply the questions. ST1 tried to ask and be patient. She set ten questions. These are an example.

'What are three occupations in your home?'

'In your group, what are the occupations?'

'Why do the people have different occupations?'

'What occupation does your friend have?'

'What is the role of this occupation?'

'What occupation is the best?'

'What happens in your community if you do not have a doctor?'

'If a farmer works for the doctor what happens?'

'If there are no occupations in the community what happens?'

'When you grow up what work do you think you will do?'

ST1 and her partner worked hard in this teaching. However, they smiled and reflected that it was good experience. They had learned a lot. It was easy to think and design learning activities but it was very difficult to deliver the ideas and also manage all the students in the classroom. Classroom management was the key factor in supporting effective questioning and teaching, ST1 noted. Hence, ST1 and her partner wondered about how they would organize their teaching next time.

Student Teacher 2 (ST2) and Student Teacher 5 (ST5)

ST2 and ST5 worked in pairs for teaching in the school classroom. They also taught Grade 2 but it was different room from ST1, ST3 and ST4. There were also forty-two students in the classroom. They were well organized and their classroom management effective. The classroom climate was supportive to learning (Langer 1992; Lang et al 1995). ST2 and ST5 set the rules of school classroom before teaching. Then they started to facilitate students' participation. The subject was Thai language. They used literature for children as the first step and the class developed according to the lesson plan. Then they asked questions as follows:

'Who likes to draw a picture?'

'How do Madan and Manoung develop themselves?'

'How do you be good person and give a present such as the children in the story?'

'How do you feel about being a good girl/boy?'

'What is the result of being a good girl/boy?'

'What did you learn from the story?'

Questioning of ST2 and ST5 was appropriate but some issues still needed to be addressed. They had generated a variety of questions that involved different levels of processing. Moreover, the questions were relevant to the objectives. They used questions that were brief, clear and the wording of questions was simple (Cole and Chan 1987, p. 143). The questioning of ST2 and ST5 was positive, relaxed and non-threatening. They encouraged school students to think and find the answer.

Additionally, they had been willing to accept alternative answers and gave students positive feed back for asking questions. ST2 and ST5 still knew that they needed to improve questioning skills. They called the name of individual students randomly when they first asked a question of the class. Then they asked specific students questions to which they needed to respond. However, ST2 and ST5 distributed their asking of questions across all class members.

Learning log

There were fifteen weeks of teaching and learning in the course. The sixteenth week was a final examination. Each student teacher reflected on their thinking and practice in a learning log every week after class. In addition, each student teacher set a

question in his/her learning log every week. They asked questions about what will happen in the next week. It was a strategy to support student teachers to practise questioning and thinking. Self-questioning enhanced metacognition and the reflection of student teachers (Wilson and Wing-Jan 1993).

In the course, student teachers were aware of the learning framework first. They learned to apply Bloom's Taxonomy in the learning process. Student teachers reflected on their learning, what they got from their experiences and how they managed their learning. They analyzed their friends' teaching critically. Reflection in the learning log has shown that they also engaged in critical thinking about what they were doing and learning. Student teachers found good ways to design and practise in the university and school classroom. Questioning was an activity that helped the student teachers to think and apply their knowledge to experiences in the school classroom. In addition, the learning log showed that student teachers reflected a good attitude to learning and practise teaching in the university and school classroom. They felt happy in their learning activities. They would like to be good teachers. The key themes and issues from the writing in the learning log of five student teachers is reported in Figure 5.13.

Figure 5.13: Summary of the Reflection of Thinking of Student Teachers from Learning Log

Student Teachers	ST1	ST2	ST3	ST4	ST5	Total	Percent %
Themes							
<i>Student teacher attitudes</i>	5	9	12	9	18	53	17.43
<i>Questioning skill</i>	13	11	23	14	12	73	24.01
<i>Awareness inclusion of critical thinking</i>	17	9	10	8	17	61	20.07
<i>Awareness inclusion of creative thinking</i>	11	1	1	2	2	17	5.59
<i>Learning framework</i>	22	13	27	15	23	100	32.89

In further reporting in learning logs, student teachers commented (Figure 5.14):

Figure 5.14: Reporting of Student Teachers from the Learning Log

Themes	Reporting of student teachers
Questioning	<i>'Today I learn and play. It is very fun. I got the experiences in teaching and questioning.'</i>
	<i>'My friends set questions very well. They developed more.'</i>
	<i>'The good learning process come from questioning.'</i>
	<i>'Questioning is developed to high order thinking.'</i>
	<i>'Questioning is very powerful. So everyone should questioning.'</i>
	<i>'The lecturer used questions with student teachers to discuss and review knowledge.'</i>
	<i>'It started from simple questions to high questions.'</i>

	<p><i>High question is question to promote knowledge and thinking process.'</i></p>
	<p><i>'When I answered questions, I must think, analyse, synthesize and reflect by own words.'</i></p>
	<p><i>'We changed to ask and answer questions. I am happy, funny and exciting.'</i></p>
<p>Learning</p>	<p><i>'This activity is very useful I developed my teaching.'</i></p>
	<p><i>'I looked the past as I looked at a mirror. I inquired the strength and weakness.'</i></p>
	<p><i>'The teacher should be an active learner.'</i></p>
	<p><i>'Students have learned a lot, if they learned by doing and questioning.'</i></p>
	<p><i>'Today, I listen, read, speak, write and think.'</i></p>
	<p><i>'Learning by doing enhanced my learning.'</i></p>
	<p><i>'If I usually meet problems, I should find the good solution to solve problems.'</i></p>
	<p><i>'I will apply knowledge from the course to develop my thinking process. I will create the creativity project.'</i></p>
	<p><i>'Every experience is not the end.'</i></p>
	<p><i>'Presentation concept mapping showed the creative thinking as well.'</i></p>
	<p><i>'Learning from this course and 'General Methods of Teaching' course helped me the good personality and good attitude being a teacher.'</i></p>
<p><i>'This course is the main of theory, skills and practical. The most important is thinking process development. Being teacher is life long learning. The lecturer inspired me to think. Moreover, she gave me good suggestion. She is very good teacher. She is role model. Thanks my teacher.'</i></p>	

Bloom's Taxonomy	<i>'After learning activities, the results is the goal.'</i>
	<i>'It helped us to learn how to analyse and process.'</i>
	<i>'The activities enhanced me to systematic thinking.'</i>
	<i>'Concept mapping is very fun, we cooperate to think.'</i>
	<i>'Today I think a lot.'</i>
	<i>'I have learned to listen and thinking.'</i>
	<i>'Concept mapping promote my left and right brain growth.'</i>
	<i>'I always think. It enhanced better thinking process.'</i>
	<i>'I have learned to apply lesson planning. It is difficult but I will try.'</i>
	<i>'Problem solving skill is an ability being good teacher.'</i>
Six Thinking Hats	<i>'I like Six Thinking Hats. It is easy to think and question.'</i>
Attitudes	<i>'The lecturer always asks questions. It is very fun.'</i>
	<i>'I felt be funny. I like it so much.'</i>
	<i>'I felt better if I practice more.'</i>
	<i>'It challenged me to solve the problems.'</i>
	<i>'I am very glad and proud to be your participants.'</i>
	<i>'I am so proud to solve problems.'</i>
	<i>'I am very glad. I can classroom management. I am so proud when school students are competitive the answers.'</i>
	<i>'The activity is very good. It promoted my thinking.'</i>
The university classroom	<i>'Today it is very fun. We are always laugh.'</i>
	<i>'The classroom climate supported me to learn.'</i>
	<i>'The personality of lecturer is a part of classroom environment. It made the classroom changed.'</i>

Lecturer's Journal

In the Professional Experience 2 subject, the lecturer also wrote the journal after each class finished. It reflected teaching and learning, feeling and thinking in the university and school classroom. From the journal, it showed that the lecturer had learned within the learning framework, learning to facilitate and plan activities such as the thinking process in terms of Bloom, cooperative learning and Six Thinking Hats. The lecturer planned the learning activities by focusing on questioning skill development. Student teachers learned to develop questioning through activities, such as speaking, writing, listening and reading. The journal also showed that the lecturer accepted and developed learning in the university classroom (Pasner 2000). These are some reflections on the thinking process of the lecturer.

'Activities in the university classroom triggered student teacher questioning skill development.'

'I accepted thinking process of student teachers.'

'Student teachers should cooperate with lecturer for learning.'

'Six Thinking Hats can be applied to Bloom.'

'I really have learned to be good facilitator.'

'I can apply learning activities.'

'I have learned to teach and be flexible as well.'

'I understood that why I needed to collect data for so long was because I can understand changing.'

From the beginning until the end of the implementation stage of this action research cycle in the course, the lecturer felt comfortable and was happy and confident to facilitate student teacher learning (Reid 1997; Wilson 2002). Moreover, the lecturer thought that the teaching profession was a challenging profession, and that it required teachers to be creative and critical thinkers and planners. Implementing the course was a way to learn how to be good teacher and to be patient (Zuber-Skerritt 1992; Calderhead and Shorrock 1997; Stringer 1999; Lang et al, 1995). In addition, supporting student teachers was powerful as this enabled the student teachers to learn more. Some examples of this support are as follow:

'I believe that you can do it well.'

'Every experience is learning process.'

'Cheers'

'Great'

'Try again'

'Take care'

In this stage, the lecturer included critical and creative thinking in learning activities. Developing critical and creative thinking was a part of learning from implementation. The lecturer also needed to create and design lesson plans to encourage thinking process. Reflection from the journal showed that student teachers were aware of the development of their own critical and creative thinking too. A summary of these points are shown in Figure 5.15.

**Figure 5.15: Summary of the Reflection of Thinking of Lecturer from Journal
(Cycle 2)**

<i>Themes</i>	<i>Number</i>	<i>Percent</i>
<i>University lecturer attitudes</i>	18	18.37
<i>Questioning skills</i>	20	20.41
<i>Awareness inclusion of critical thinking</i>	14	14.29
<i>Awareness inclusion of creative thinking</i>	12	12.24
<i>Learning framework</i>	34	34.69

Group interview

The end of semester in the Professional Experience 2 subject, after all grades have been assigned and made known to the student teachers, they were invited to participate in the research further. There were five student teachers who were participants in this stage. Random sampling was used to select those who participated. A group interview of five student teachers focused on the following questions:

- How often did you use questions in your class?
- How did you feel when the lecturer asked questions?
- How do you feel when you must ask a question?
- How did you develop appropriate questions?
- What did you learn from questioning?
- What problems did you have in class activities?
- How did you solve the problems?

- How do you understand your ability for framing questions?
 - before class activities
 - after class activities
- What, if anything, have you learned from this work?
- How did the climate of the university classroom support or hinder your learning?

The discussion and reflection of student teachers' learning, questioning and thinking was analysed and this is shown in Figure 5.16. This Figure explains the details of group interview.

Figure 5.16: Summary of Group Interview of Student Teachers

<i>Questions</i>	<i>Responses</i>	<i>Number (Student teachers)</i>
1. How often did you use questions in your class?	<ul style="list-style-type: none"> • Average • Very often 	1 4
2. How did you feel when the lecturer asked questions?	<ul style="list-style-type: none"> • Excited (Be happy, fun) • Good 	4 1
3. How do you feel when you must ask a question?	<ul style="list-style-type: none"> • Fun • Think more 	4 1
4. How did you develop appropriate questions?	<ul style="list-style-type: none"> • By focusing on content/learner and analysis • Observe the environment 	4 1
5. What did you learn from questionings?	<ul style="list-style-type: none"> • Cognition, how to develop thinking process and good system question 	5
6. What problems did you have in class activities?	<ul style="list-style-type: none"> • None • Group work (Brainstorming) • A little about the thinking 	3 1 1
7. How did you solve the problems?	<ul style="list-style-type: none"> • By self-practice • By using cooperative learning 	1 1
8. How do you understand your ability for framing question?	<ul style="list-style-type: none"> • Before class activities <ul style="list-style-type: none"> - Good but need to develop • After class activities <ul style="list-style-type: none"> - Very good - Excellent 	5 3 2

9. What, if anything, have you learned from this work?	<ul style="list-style-type: none"> • Questioning • Cooperative Learning/Social skill 	<p>2</p> <p>2</p>
10. How did the climate of the university classroom support or hinder your learning?	<ul style="list-style-type: none"> • Apply theory into practice • Excellent/friendly/supportive/relaxing/active/ conducive to learning 	<p>1</p> <p>5</p>

Discussing of group interview responses

Reflection on the thinking of student teachers showed that the learning activities of Professional Experience 2 course promoted student teachers’ questioning development. Student teachers were better able to question and were aware of the power of questions. In this stage student teachers said they were excited about questioning but they were happy and enjoyed questioning too. The learning activities helped them to practise questioning and to analyse questions more. Student teachers set questions by focusing on content and analysing learner responses. They were trained in teaching and questioning in the university and school classroom. Student teachers developed good classroom questions. These are some comments of student teachers are listed below in Figure 5.17.

Figure 5.17: The Comments of Student Teachers From Group Interview

<i>Themes</i>	<i>Comments of student teachers</i>
Questioning	<i>‘I felt better questioning but it is not excellent.’</i>
	<i>‘Questioning is the reflection thinking process of students.’</i>
	<i>‘For the past I cannot understand questions but I am better questioning. Questions are high level.’</i>

	<i>'Questioning is powerful.'</i>
	<i>'Good systematic questioning.'</i>
	<i>'For the past I did not like to ask questions. I am shy. I did not focus my thinking for questioning. Now it is better, I focus thinking process for questioning.'</i>
Learning	<i>'I have learned to think and trigger other to think more.'</i>
	<i>'I have learned that questioning is easy approach to help students learn. It is activity that teacher can plan leading the goals.'</i>
	<i>'I have learned that a teacher is important person to enhance student thinking process development.'</i>
	<i>'All activities are learning process. Good relationship, cooperative and learning concerned learner. I have learned to be a teacher.'</i>
Bloom's Taxonomy	<i>'....I cannot do it. Then I self-practice, rethinking and I can apply from questioning to analyse or investigate the project.'</i>
	<i>'I practice learning activities in the, university and school classroom. It is the way to apply questions. Questioning is better.'</i>
	<i>'Learning activities applied and synthesis in the real situation.'</i>
Attitude	<i>'I am fun to questioning.'</i>
	<i>'Writing learning log is very good. I have learned a lot.'</i>
	<i>'It is necessary for teacher to questions.'</i>
	<i>'The teacher triggers learners by questioning, the learners will be active. It is better to lecture only and do not ask questions.'</i>

The University classroom	<i>'The classroom climate is supportive to think. I am triggered to think. The lecturer as a guide.'</i>
	<i>'The other course, the lecturer lecture only. I am sleepy. I am not interested in learning.'</i>
	<i>'It is warm and safe. I would like the other courses as same as this course.'</i>
	<i>'It is safe. Lecturer is supportive me learning. The other course, I am shy to ask questions.'</i>
	<i>'The classroom climate is active. I would like to cooperate learning activities. The activities enhance learning.'</i>

From action learning in the General Methods of Teaching to the Professional Experience 2 course, it was possible to get started with questioning so that the higher order thinking of student teachers was encouraged to develop. Recording phenomenology of action in both cycles was presented and reported in Chapter 4 and Chapter 5 which showed the process of activities, the findings and development as a result of the university teaching and learning program, practice teaching and of the action learning and research process. There were changes in questioning and thinking processes of student teachers performance. However, the results of the study, specifically what teaching and learning approaches support the development of student teachers' questioning skills are presented in the next chapter. Chapter 6 shows the findings of the research through a discussion of the research and Chapter 7 looks what the impact of these findings is and suggests a new paradigm of pedagogy in Thailand schools and teacher education.

Specific Issues Relating to Thai Education

In this stage the student teachers were further trained in questioning through learning activities in the university classroom and they were asked to apply this knowledge in their own lessons in the school classroom. The student centred approach and the strategies to develop metacognition were focused to promote student teacher questioning skills (Wilson and Wing-Jan 1993, Lang et al 1995, McInerney and McInerney 1998, Office of the National Education Commission 2000a, and Phifer 2002). However, student teachers were also encouraged to set in higher level questions and be confident teaching in the school classroom.

The results show that student teachers enjoy this new approach and were willing to explore deeper and more rigorous questioning. They have learned how to ask and answer using questions and thinking at different levels of Bloom's Taxonomy (Bloom 1956). As well student teachers reflected that the thinking process is developed by questions. In the cycle 2, the questions were set using the higher order thinking framework and student teachers must think more deeply and more reflectively when answering. Taking time to consider the question and the answer proved an important factor in teaching thinking too. Thai students are not used to being able to have time to consider their responses, or and student teachers have not been encouraged to wait for their school students to consider answers or discuss their responses to questions with other students.

In the school classroom, if teachers are aware of questioning and have good attitudes in teaching thinking, this will support and enhance the development of higher order thinking in learners. Some Thai teachers in school still lack this knowledge and understanding about how to develop thinking process in the school classroom, although the Prime Minister and Ministry of Education in Thailand will promote and train teachers in teaching thinking. Nevertheless, there are few books and little research focused on thinking process development which have been developed by Thai educators. Therefore, this research is reasonably new work in understanding approaches to facilitate learner questioning and thinking skills. It should provide student teachers and some Thai teachers with a model of improved teaching and learning.

Reflecting on cycle 2 it is noted that there are many issues which are relevant for Thai teachers and teacher education development and should be considered as the basis for setting new teacher education strategies. Firstly, student teachers in the Faculty of Education should be trained in questioning and thinking skills through learning activities in the university and school classroom. Next, teachers in school should be encouraged to realize how to facilitate and enhance thinking process in learners through student centred approaches. They need professional development to understand that thinking process development needs to take time and be part of a continual focus. It cannot be achieved through short term professional development, but rather requires long term professional action learning which models the approaches and strategies as part of the professional learning experience. Finally, a positive learning environment will support the development of independent learners

and thinking should be considered as well (Wilson and Wing-Jan 1993, and Tishman, Perkins and Jay 1995). This is a significant shift for Thai classrooms where there has traditionally been little emphasis on classroom climate and the relationship between teacher and students. Indeed, students are expected to behave well, class sizes are large and it is very difficult for each teacher to develop a warm relationship with each student and encourage open conversation in classrooms. The physical environment makes this simply much harder than in western schools where class sizes are much smaller.

In this research however, some of these difficulties were overcome in the school classrooms. In classrooms where classes were planned and a systematic approach was carefully constructed to build learning and thinking processes in children through conversation, inquiry and questioning, children were able to demonstrate different and higher order thinking in response to the student teacher. This was despite the large class sizes and the normal classroom environment which was teacher centred.

Additionally, the use of teacher and student teacher reflection enhanced the learning of both the lecturer and student teachers and it also promoted the realization of the importance of a positive classroom environment, further supporting a learner centred pedagogy. This reflection led to significant professional learning. Findings from this research challenge existing structural and social arrangements in Thai university and school classrooms, foster new ideas and the action learning approach stimulates continuous teacher learning for reform in Thailand.

Chapter 6

Two Way Reflection

Introduction

This research employed an action research methodology. The lecturer worked with student teachers for two semesters and analysed their records of practice, including learning logs, lesson plans and the lecturer's journal. Group interviews were also conducted at the end of semester once the work had all been graded and student teachers had volunteered for the research. Student teachers were invited to submit these written records and to take part in a reflective group interview about these records and their own experiences. The focus of the data collection was on inquiry about the developing questioning skills of student teachers. There were two cycles of the data collection, the first in semester 2, 2002 and then with the same cohort of student teachers, in semester 1 2003. Each cycle was the same but fewer student teachers were included in the second cycle to attempt to develop deeper understanding of student and teacher learning.

Learning inquiry approaches

Cycle 1 was implemented in the General Methods of Teaching subject. The participants were ten student teachers. For Cycle 2, implemented in the Professional Experience 2 subject, the participants were five student teachers. They all study in the Faculty of Education, Burapha University, Thailand. Data Collection techniques included the collection of student teacher lesson plans, learning logs, documents, journal of lecturer and audio-taped group interviews. Each cycle was completed by focusing on the lecturer's lesson plans. The research investigated learning and teaching approaches to assist student teachers to develop thinking and questioning skills.

There were three factors leading the teaching goals. They were classroom activities, the learning process and practical activity in the university classroom and its application in the school classroom. These are the guidelines for action in both cycles. The details are shown in Figure 6.1 – Figure 6.3.

Figure 6.1: The Classroom Activities

<i>Cycle 1</i>	<i>Cycle 2</i>	<i>Remarks</i>
<p>• Cooperative learning was designed according lesson plans.</p> <p>- Group process The activities involved the working in groups, oral presentation of group, group interview the guest speakers (The 12th lesson plan), playing games and sharing experiences.</p> <p>- Think-pair-share (The 10th lesson plan is an example).</p> <p>- Partners compare - Partners check - Group discussion</p>	<p>• Cooperative learning was designed and integrated in the activities of the lesson plans.</p> <p>- Group process Student teachers worked and presented in groups, eg reporting and presentation of good models of teaching in primary and secondary school (The 2nd lesson plan). In addition, group teaching was implemented in the 11th - 14th lesson plan. Student teachers planned to set and develop lesson plan. The lesson plans need to have at least six questions.</p> <p>- Think-pair-share. The example is 1st lesson plan. Student teachers worked in pairs in discussion during the course.</p> <p>- Partners compare - Partners check - Group discussion</p>	<p>In Cycle 2 the activities were planned to review teaching skills and prepare student teachers to be good teachers.</p> <p>Sharing questions and answers</p>
<p>- Jig saw In the 12th lesson plan, the lecturer divided student teachers in to 4 groups. Each group discussed different topics. Then student teachers were divided into new groups. Each new group consists of members from group 1, 2, 3 and 4. Group oral presentation by using concept</p>		

mapping.		
<p>- Sharing experiences</p> <p>In the 6th lesson student teachers shared their learning log. Student teachers wrote positive comments in the learning log.</p>	<p>- Sharing experiences</p> <p>Sharing learning logs was in the 4th, 10th and 15th lesson plan.</p>	<p>The Cycle 2 the student teachers shared learning log more than Cycle 1.</p>
<p>• Six Thinking Hats was implemented in the 7th, 8th, and 9th lesson plan. Student teachers focus thinking on the colors of each hat.</p>	<p>• Six Thinking Hats was implemented in the 3rd lesson plan. Student teacher watched video of two student teachers who were volunteers to reflect their demonstration teaching from the Cycle 1.</p>	<p>Student teachers like the process of focusing thinking and questioning around the Six Hats.</p>
<p>• Concept mapping was the activity enhance creative and critical thinking. It showed on the 2nd lesson plan.</p>	<p>• Concept mapping was the activity to conclude group work on what/how good question is. It showed on 15th lesson plan.</p>	
<p>• Round robin</p> <p>Student teachers sat in the cycle. Then each student teacher asked question. The next student teacher answered questions (The 10th lesson plan).</p>	<p>• Round robin</p> <p>Student teachers sat in the cycle. Then each student teacher asked question. The next student teacher answered question. The questions focused on teaching and learning in school (The 15th lesson plan).</p>	
<p>• Using poems and songs</p> <p>The activity was designed in the 11th lesson plan. Planning music and poems helped student teachers write the main idea. The activity lead them to write the lesson plan. In addition, it supported them to answer questions</p>		
<p>• Role playing and simulation.</p> <p>Student teachers volunteered to simulate good teaching skills and bad teaching skills. Then the</p>		

<p>lecturer asked questions (The 6th lesson plan).</p>		
<p>• Demonstrated teaching Student teachers set lesson plans and wrote at least six questions. Then they taught as step-by-step according to the lesson plan (The 13th - 16th lesson plan).</p>	<p>• Demonstrated teaching - Student teacher demonstrated teaching in the university classroom (The 5th, 6th, 7th lesson plan). - Student teachers set lesson plan by writing at least six questions. Then they gave positive comment and analysed strengths and weakness of teaching demonstration (The 11th, 12th, 13th and 14th lesson plan). Student teachers worked in pairs, developed lesson plans. They planned for team teaching. Their lesson plans had at least six questions, and each student teacher asked at least three questions in his/her teaching. Each group took turns to observe the team teaching.</p>	<p>The Cycle 2 student teachers were discussed about what/how the good classroom questioning.</p>
<p>• Questioning The activities promoted thinking and questioning skills. Student teachers practised step by step according the 1st till 16th lesson plan. The question started from yes-no questions, closed questions, opened questions, rhetorical questions, Bloom's Taxonomy and de Bono's Six Thinking Hats.</p>	<p>• Questioning The activities promoted thinking and questioning skills. Student teachers created questions, reflected and used questions. Then they learned to analyse, synthesis and evaluate questions and questioning. Student teachers have learned to develop the types of questions. Student teachers analysed what the high level questions are (The 3rd, the 4th, 15th lesson plan).</p>	<p>The cycle 2 was designed to review, set and analyse questions by individual and group work.</p>

The activities conducted to foster the learning of questioning of student teachers were:

- practising questioning skills step-by-step through action learning.
- reflecting on the questioning and thinking process by asking, answering,

discussion, presentation, demonstration teaching, writing cards, and writing learning

log. In the General Methods of Teaching and Professional Experience 2 teaching was

focused on the learning process which was set and promoted them to be a learner and

an effective teacher. The plan for developing understanding of the learning process is

shown in Figure 6.2.

Figure 6.2: The Learning Process of Student Teachers

<i>Cycle 1</i>	<i>Cycle 2</i>	<i>Remark</i>
• Reflective and metacognitive thinking	• Reflective and metacognitive thinking	Student teachers used learning log to reflect their thinking, feeling. Some student teachers wrote their problems and asked for the suggestion. Hence, supporting is very powerful and promote student teacher found a way to solve problems.
- Writing learning log. Each student teacher must write learning log every week after class. They reflected what they have learned and what the activity was. Student teachers recorded personal responses, queries, feelings, changing ideas, thoughts and knowledge about the processes and content of their learning. Moreover, student	- Writing learning log. Each student teacher must reflect his/her thinking on learning log. Student teachers sent and got supportive and positive feedback every week. They designed model of writing learning log. In addition, they wrote what they have learned and how they have learned. Some student teachers developed creative thinking and	

<p>teachers have to answer or question in their learning log. Some student teachers created learning log by drawing picture and concept mapping. This process is central to learning for both lecturer and student teachers.</p>	<p>communication skills.</p>	
<p>• Action learning Student teachers planned, acted observed and reflected in their working. They explored the cognitive, affective and cognitive levels of thinking.</p>	<p>• Action learning Student teachers transferred their knowledge through experiences learning of the past. They practised teaching skills. Then student teacher observed and reflected by discussion and comment. They explored own their learning styles leading to the goal.</p>	
<p>• Constructivist approach The lecturer was a guide and facilitated student teachers to learn and be an independent learner. Moreover, the principles of teaching for quality learning was careful in these issue (Lounghran, 2002, p.10). Student teachers got opportunity to think and own decision-making. The lecturer inspired student teachers to learn from each other. Authentic assessment was a part of learning process. The General Methods of Teaching course was 50% individual work and group work, and 50% final examination. Student teachers' individual work was writing a learning log (10%), writing lesson plans (10%) and</p>	<p>• Constructivist approach The Cycle 2 the learning process was creating knowledge structures, mental models that facilitate deep learning. The role of lecturer was a facilitator and as a coach of student teachers to construct their learning. Lesson plans were set and planned learning activities, materials and evaluation in the positive environment. The Authentic assessment was a part of learning process. The assessment of the Professional Experience 2 was 50% individual work and group work and 50% final examination. Student teachers' individual work was writing a learning log (10%), writing lesson plans (10%) and</p>	

demonstration teaching (10%). Student teachers group work is assessed by reporting and presentation (10%) and group teaching (10%).	demonstration teaching (10%). Student teachers group work was assessed by reporting and presentation (10%) and group teaching (10%).	
<p>• Build classroom environment</p> <p>The classroom management was realized from the concept to Rogers (Tauber, 1995, p. 28). In addition, a humanistic approach stimulated a warm supportive relationship between lecturer and student teachers. The classroom climate was friendly and helpful and nonthreatening. Student teachers smiled and laughed and learned happily. The classroom management promoted thinking and questioning.</p>	<p>• Build classroom environment</p> <p>Lecturer planned the positive environment as same as the being as a friend and good relationship. Student teachers always talk and tell what they need to know and learn. Some activities were suggested by student teachers. Being a positive attitude learner is very important. Hence, the classroom atmosphere was safe and supportive. Student teachers were happy to learn and set questions.</p>	

The process of learning is significant and develops continually. The university classroom management was effective and encouraged learners to be good thinkers. This developed in a safe environment which encouraged them to reflect on their learning and be self-confident learners. Such a safe environment for inquiry is not normally acceptable in Thai classrooms, indeed students are rarely invited to question each other or the engage with the teacher. So this was indeed and significant shift in pedagogy at the university. In the General Methods of Teaching and Professional Experience 2 course, student teachers had an opportunity to practise questioning, answering and teaching.

Practical thinking and questioning

Thinking can be improved by practice, training and teaching. Learning activities in the courses were designed to develop thinking and questioning skills, learning by doing and practice is a way for deep learning and sustainable development to be achieved (Biggs & Moore 1993). The tasks designed to develop these skills were experiences planned and taught in the university classroom with the student teachers. The details of the practical activities in which student teachers engaged are shown in Figure 6.3.

Figure 6.3: The Practical of Student Teachers

<i>Cycle 1</i>	<i>Cycle 2</i>	<i>Remark</i>
<ul style="list-style-type: none"> • Questioning and answering - The lecturer used name cards to call the name of student teachers questioning and answering. Student teachers volunteer for questioning and answering. - Student teachers were selected by purposive questioning and answering. 	<ul style="list-style-type: none"> • Questioning and answering - The lecturer used name cards to call the name of student teachers questioning and answering. -Variety of questions were used in university classroom. - Student teachers practised questioning and answering that questions distributed across all class members by volunteer and purposive. The 1st, 2nd, 3rd lesson plan were an examples. - Student teacher worked in groups to analyze the type of questions (The 2nd, 3rd lesson plan). 	<p>The Cycle 2 student teachers were trained and practised for good classroom questions.</p>
<ul style="list-style-type: none"> • Teaching Skills 	<ul style="list-style-type: none"> • Teaching Skills 	

<ul style="list-style-type: none"> - Each student teacher set lesson plan and individual teaching in the classroom university. Then student teachers asked questions to evaluate lesson (The 13th - 16th lesson plan). - Student teachers worked in pairs and demonstrated teaching in the university classroom (The 8th, 9th lesson plan). - Listening skill is a way to enhance thinking process. 	<ul style="list-style-type: none"> - Each student teacher designed the lesson plan and demonstrated teaching in the university classroom (The 5th - 7th lesson plan). - Student teachers worked in pairs and demonstrated teaching in the school classroom (The 11th, 12th, 13th, 14th lesson plan). - Listening skill is a way to promote questioning and thinking. 	
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Learning questioning for teaching by engaging, doing and practicing inquiry in the university classroom and school classroom guided student teachers so that they were able to transfer this knowledge to the real situation. Thoughtful language was modeled and developed in the university and school classroom (Tishman et al 1995, pp 11-12). Student teachers were comfortable to engage in questioning.

Findings

The lecturer reflected on her own teaching through the learning process of student teachers. The student teachers were able to reflect systematically upon practice and to subject such reflections to critical scrutiny. They were assisted in getting to a deeper understanding both of the learning situations and their questioning. Performance improved through more systematic reflection upon practice. This reflective practice led to self directed learning and deliberation about the goals and values of practice as they engaged in naturalistic inquiry, narrative or telling a story as it is felt and seen by the practitioners themselves. Again, explicit reflection was new to these students,

especially as a critical component of the learning process. The idea of developing a community of inquiry or engaging in dialogue which challenged ideas, opinions and accepted facts and knowledge was foreign and difficult. Yet the students all were able to change their learning practice over the two semesters and comment strongly on their metacognition about change and learning environments, as well as the role of questioning in establishing and supporting inquiry based learning and higher order thinking.

The reflection on university classroom learning between the lecturer and student teachers enabled some conclusions to be developed regarding the use of the theoretical framework to guide reflection on and the development practice to be drawn. From the two cycles of implementation in this research, the data generated and analysed about classroom activities, Six Thinking Hats, lesson plans, self-evaluation, lecturer's journal, learning logs and group interviews were also able to be comparatively analysed.

Classroom activities

Student teachers developed questioning skills from lower order questions to higher order questions. In the Stage 1 (Cycle 1) student teachers set 'comprehension' questions first. There were some questions which are 'not clear'. The 'not clear' questions included the questions that were not related to the situation, the questions did not fit any categories and sentences that were not questions. In the Stage 3

(Cycle 2) student teachers set 'analysis' questions first. These questions lead to the higher order questions. There were no 'not clear' questions in the Stage3 (Cycle 2). Student teachers had learned to plan for critical questioning. This showed that there had been development in the student teacher thinking about questions and questioning. The results showed that student teachers presented good questions and they have better questioning skills. Higher order questions were designed and practised in the university classroom activities. The comparison of questioning of student teachers in classroom activities is shown in Figure 6.4.

Figure 6.4: Comparison of Questioning of Student Teachers in Classroom

<i>Activities</i>			
<i>Ranking</i>	<i>Stage 1 (Cycle 1)</i>	<i>Stage 3 (Cycle 2)</i>	<i>Change</i>
	<i>Categories</i>	<i>Categories</i>	
1	Comprehension	Analysis	Student teacher changed to set the level of questioning. It shows that they learned to set higher order thinking. In addition, they learned how to set questions effectively because there are no 'other' (Not clear) questions in the Stage 3 (Cycle 2).
2	Knowledge	Knowledge	
3	Other (Not clear)	Synthesis	
4	Application/Analysis	Evaluation	
5		Comprehension	
6	Synthesis	Application	
7	Evaluation		

Questioning using Six Thinking Hats

In the Stage 1 (Cycle 1) student teachers at first set questions which can be categorized as white and black hat questions. These questions are about facts, recall and weakness or negative issues. The Stage 3 (Cycle 2) student teachers at first set questions which can be categorized as green hat questions. They had developed questioning skills, focused on creative thinking and finding a new way in the situation (de Bono 1987). The data show the development from surface level inquiry, literal interpretation of ideas and information to emerging higher order thinking, more open critical and creative questioning and increasing comfort with this new pedagogy. The details of the change are shown in Figure 6.5.

Figure 6.5: Comparison of Questioning on Six Thinking Hats of Student Teachers in Classroom Activities

<i>Ranking</i>	<i>Stage 1 (Cycle 1)</i>	<i>Stage 3 (Cycle 2)</i>	<i>Change</i>
	<i>Categories</i>	<i>Categories</i>	
1	White / Black hat	Green hat	The Stage 3 (Cycle 2) student teachers changed questioning from fact and negative issues to the creative thinking questions.
2		Yellow hat	
3	Green hat	Blue hat	
4	Red / Yellow / Blue hat	Black hat	
5		White / Red hat	
6			

Questioning from lesson plans

Each student teacher was required to create the learning activities and plan at least six questions in each lesson plan. During Stage 1 (Cycle 1) the questions which student teachers set were not relevant to the instructional objectives and student teachers did not use a variety of questions. Moreover, the questions focused on ‘knowledge’ and fact seeking questions. In Stage 3 (Cycle 2) the questions were more developed and reflected higher order thinking, such as ‘analysis’, ‘synthesis’ and ‘evaluation’. This higher order level of questions is very important to enhance student teachers and school students in the university and school classroom (Slade 1995; Thomas and Albee 1998; Moore, 1998). The comparison of questioning from lesson plans is shown in Figure 6.6.

Figure 6.6: Comparison of Questioning from Lesson Plans of Student Teachers

	<i>Stage 1 (Cycle 1)</i>	<i>Stage 3 (Cycle 2)</i>	<i>Change</i>
	<i>Categories of Questions</i>	<i>Categories of Questions</i>	
1	Knowledge	Knowledge	Student teachers separated questions and systematic questioning. The questions are clear and were asked step-by-step. There were no ‘others’ (not clear) questions in the Cycle 2.
2	Comprehension	Analysis	
3	Analysis	Comprehension	
4	Application	Synthesis	
5	Other (Not clear)	Application	
6	Synthesis /Evaluation	Evaluation	

Self-evaluation

In Stage 1 (Cycle 1) and Stage 3 (Cycle 2) the lecturer assigned student teachers to evaluate themselves by answering seven questions. These are as follows:

1. What have you learned from this subject?
2. What were your learning strategies?
3. Were you successful in your learning by using those strategies?
4. What skill do you think you are good at?
5. What do you think you can improve?
6. What else do you need to do to improve yourself?
7. Others/ Comments?

A comparison of the self-evaluation of student teachers has been made with respect to learning, learning strategies, developing skills and skills they need to improve. This is shown in Figures 6.7- 6.12.

Figure 6.7: The Comparison of Self-evaluation of Student Teachers With Respect to What They Have Learned from the Subject

Ranking	Stage 1 (Cycle 1) Learning	Stage 3 (Cycle 2) Learning	Change
1	Knowledge	Teaching skills	Student teachers have learned to apply teaching and questioning in action.
2	Thinking process	Questioning/ Lesson planning/ Application	
3	Cooperative learning		
4	Teaching skills		
5	Questioning	Thinking process	
6	Self-confidence	Analysis/ Review learning process	

Figure 6.8: The Comparison of Self-evaluation of Student Teachers With Regard to Their Learning Strategies

Ranking	Stage 1 (Cycle 1) Learning Strategies	Stage 3 (Cycle 2) Learning Strategies	Change
1	Questioning	Practical	The Stage 3 (Cycle 2) student teachers have learned more by practice, observation and cooperative learning. The learning strategies were developed and leading student teachers to be good teachers.
2		Observation	
3	Lecture/ Cooperative learning	Cooperative learning	
4		Thinking process/ Self - study	
5	Practical		
6	Answering/ Analysis	Discussion	

Figure 6.9: The Comparison of Self-evaluation of Student Teachers Focusing on the Appropriateness of Their Learning Strategies

Stage 1 (Cycle 1) Learning Strategies	Stage 3 (Cycle 2) Learning Strategies	Change
Appropriated 95%	Appropriated 100%	Student teachers have learned to think by themselves.

Figure 6.10: The Comparison of Self-evaluation of Student Teachers on Skills

Ranking	Stage 1 (Cycle 1) Skills	Stage 3 (Cycle 2) Skills	Change
1	Cooperative learning	Questioning	Questioning is the skill that student teachers developed. Presentation and teaching skills are promoted as well. Student teachers practiced teaching skills more and applied theory in practice. They are enhanced thinking process too.
2	Questioning	Presentation	
3	Thinking process	Teaching skills	
4	Presentation	Thinking process	
5	Listening/Discussion/ Application	Cooperative learning/ Attend class	

Figure 6.11: The Comparison of Self-evaluation of Student Teachers on What They Think They Can Improve

Ranking	Stage 1 (Cycle 1) Skills	Stage 3 (Cycle 2) Skills	Change
1	Thinking process	Questioning	Student teachers have improved questioning. They felt self-confidence for teaching in university and school classroom.
2	Presentation	Teaching skills/ Self-confidence	
3	Questioning/ Teaching skills/ Self-confidence		
4		Classroom management	
5		Lesson planning	
6	Answering		

Figure 6.12: The Comparison of Self-evaluation of Student Teachers on the Skills They Need to Improve

Ranking	Stage 1 (Cycle 1) Skills	Stage 3 (Cycle 2) Skills	Change
1	Thinking process	Questioning	In the Stage 3 (Cycle 2) student teachers need to improve questioning, teaching skills and classroom management. They need to practice more especially in the school classroom. Student teachers need to be trained more. It should be take time to promote student teachers to learn how to be effective teacher.
2	Self-confidence	Teaching skills	
3	Presentation	Classroom management	
4	Questioning	Thinking process/ Presentation/ Lesson planning	
5	Self-study		
6	Practical (Teaching)		

Learning log

In Stage 1 (Cycle 1) and Stage 3 (Cycle 2) student teachers reflected on their thinking and learning after class. The lecturer commented and provided feedback in their learning log. Some student teachers wrote the problems and the lecturer suggested problem solving approaches to these. This reflecting, writing and the lecturer's supporting comments were significant and encouraged them to think and find the best solution themselves. Writing a learning log is a process that was implemented and designed to enhance student teacher's metacognition. Findings from the analysis of the learning logs have shown that student teachers improved their writing skills. They also developed communication skills. Moreover, they planned to write and their reflection demonstrated their critical and creative thinking. The comparison of findings about student teacher reflection is shown in Figure 6.13.

Figure 6.13: The Comparison of the Reflection of Thinking of Student Teachers from the Learning Log

Ranking	Stage 1 (Cycle 1) Themes	Stage 3 (Cycle 2) Themes	Change
1	Learning framework	Learning framework	Student teachers practiced and analysed questioning more. They got opportunity to analyse and think. The classroom climate supported them to develop critical thinking.
2	Student teacher attitudes	Questioning skills	
3	Questioning skills	Awareness and inclusion of critical thinking	
4	Awareness and inclusion of critical thinking	Student teacher attitude	
5	Awareness and inclusion of creative thinking	Awareness and inclusion of creative thinking	

The lecturer's journal

The comparison of the reflection on the thinking and teaching of the lecturer from her personal journal has shown that she reflected on learning and thinking processes. The findings of this analysis are shown in Figure 6.14.

Figure 6.14: The Comparison of the Reflection of Thinking of Lecturer from Lecturer's Journal

Ranking	Stage 1 (Cycle 1)	Stage 3 (Cycle 2)	Change
	Themes	Themes	
1	Learning framework	Learning framework	The lecturer have learned to design learning activities. The emphasis is thinking process and questioning skill development. The Stage 3 (Cycle 2) the lecturer asked and set good classroom questioning. The lecturer encouraged student teachers deep understand questioning.
2	Lecturer attitudes	Questioning skills	
3	Questioning skills	Lecturer attitude	
4	Awareness and inclusion of critical thinking	Awareness and inclusion of critical thinking	
5	Awareness and inclusion of creative thinking	Awareness and inclusion of creative thinking	

Group interview

Reflective thinking and feeling of student teachers in the group interview indicates learning about questioning. They reflected understanding of their ability to frame questions and how they developed appropriate questions. The positive environment is significant to encourage thinking, learning and questioning (Lang et al 1995, p. 82;

Wilson & Wing-Jan 1993, p. 19). All these above are shown and compared in Figure 6.15.

Figure 6.15: The Comparison of Group Interviews of Student Teachers

Questions	Responses		Change
	Stage 1 (Cycle 1)	Stage 3 (Cycle 2)	
1. How often did you use questions in your class?	<ul style="list-style-type: none"> • Average • Very often 	<ul style="list-style-type: none"> • Very often • Average 	<p>Student teachers are aware of questions. They developed questioning from low to high questions. They are positive and enjoyable questioning.</p>
2. How did you feel when the lecturer asked questions?	<ul style="list-style-type: none"> • Excited • Nothing • Confused / puzzled 	<ul style="list-style-type: none"> • Excited (Be happy and fun) • Good 	
3. How do you feel when you must ask a question?	<ul style="list-style-type: none"> • Enthusiastic/ eager • Excited • Stressed • Not liked 	<ul style="list-style-type: none"> • Fun • Think more 	
4. How did you develop appropriate questions?	<ul style="list-style-type: none"> • By focusing on content and analysis • By using cooperative learning • I had trouble • By asking questions about what I need to know • By analysing the person who answers the question 	<ul style="list-style-type: none"> • By focusing on content/and analysis the person who answers the question 	
5. What did you learn from questioning?	<ul style="list-style-type: none"> • Cognition, how to develop thinking process. • Awareness of the importance questioning 	<ul style="list-style-type: none"> • Cognition, how to develop thinking process and good system questioning 	
6. What problems did you have in class activities?	<ul style="list-style-type: none"> • Not self-confidence • Lack creative thinking 	<ul style="list-style-type: none"> • None • Group work 	
7. How did you solve the problems?	<ul style="list-style-type: none"> • By self-practice • By using cooperative learning 	<ul style="list-style-type: none"> • By self-practice • By using cooperative learning 	
8. How do you understand your ability for framing questions?	<ul style="list-style-type: none"> • Before class activities - Weak/Poor • After class activities - Good and self confidence but need to develop more 	<ul style="list-style-type: none"> • Before class activities - Good but need to develop more • After class activities - Very good • Excellent 	
9. What, if anything, have you learned from this work?	<ul style="list-style-type: none"> • Cooperative learning • Thinking process • Cognition • Questioning 	<ul style="list-style-type: none"> • Questioning • Cooperative learning/Social skill • Apply theory into practice 	

10. How did the climate of the university classroom support or hinder your learning?

• Excellent / friendly / supportive / relaxing / active / conducive to learning

• Excellent / friendly / supportive / relaxing / active / conducive to learning

The results of the study found the ability of student teachers to set up questions developed. Significantly, the compared findings of Stage 1 (Cycle 1) and Stage 3 (Cycle 2) indicate that the following teaching and learning approaches in the university classroom assist the development of student teachers' questioning skills:

1. Learning activities
 - 1.1 Cooperative learning
 - 1.2 Six Thinking Hats
 - 1.3 Concept mapping
 - 1.4 Lesson plan
 - 1.5 Demonstration teaching
 - 1.6 Learning log
 - 1.7 Self-group assessment
2. The learning process
3. The positive learning environment
4. The role of university lecturer
5. The process of questioning

1. Learning activities

1.1 Cooperative learning

Cooperative learning is an approach which can improve student teachers' social skills, increase self-esteem, promote social values and provide positive motivation (Lang et al 1995, p. 354 assert in Slavin 1987). Student-centred classrooms emphasize cooperation and promote learning by working and helping others learn (Phifer 2002, p. 29). This research supports the work Lee et al (1998, p. 59) who found that cooperative learning enhances thinking process. In addition, the group process and group work in the learning activities motivate student teachers to question.

Round-robin, think-pair-share, partner interviews and group discussion are the activities that encouraged student teachers to learn questioning skills. These learning activities were based on a cooperative learning approach. The questions, answers and questioning activities were designed and student teachers were trained step-by-step. Questions started from simple developed to higher order thinking. In Stage 1 (Cycle 1) student teachers practised yes/no questions, open questions, closed questions and using Bloom's Taxonomy and de Bono's Six Thinking Hats as a framework for designing better questioning.

In Stage 3 (Cycle 2) student teachers were trained to set and analyze higher order questions. The Six Thinking Hats was used as an approach to promote higher order thinking for questioning. Bloom's Taxonomy helped student teachers understand the

development from low order thinking using closed questions to higher order thinking using more open-ended and analytical questioning.

1.2 Six Thinking Hats

The research found that using Six Thinking Hats helped student teachers develop questioning and thinking skills. Student teachers' reflection showed that the Six Thinking Hats method is easy to use to focus thinking (de Bono 1987). Moreover, Wilson and Wing-Jan (1993, pp. 73-74) assert that effective questioning and thinking skills were developed by using Six Thinking Hats' activities. The findings of the research reflect that the Six Thinking Hats was appropriate for teaching and learning in the university classroom. Student teachers can set questions and develop their lesson plans and own thinking from lower to higher order questions. The higher order questions were focused around green hat thinking which de Bono (1987, p. 135) explains is specifically concerned with new ideas and new ways of looking at things. Green hat thinking helps learners escape from the old ideas in order to find better ones. In the university classroom student teachers reflected success in green hat thinking as they developed thinking process and changed ideas of questioning. The creative ideas become evident in the Stage 3 (Cycle 2).

Teachers in educational reform in Thailand (Office of the National Education Commission 2000a, Office of the National Education Commission 2000b) have been called upon to develop more creative thinking in their teaching for improved student learning. So teaching in the university must now provide the activities to develop the

creative thinkers. The Six Thinking Hats had been suggested as an appropriated tool to develop this thinking and has been successfully applied in the research.

1.3 Concept mapping

This research has shown that student teachers developed their thinking processes and self-confidence in using reflective thinking through concept mapping. Student teachers participated in group work and presented concept mapping. This approach supported student teachers to think critically and share experiences. Wragg and Brown (2001, p. 66) suggest that a mind map provides the basis for thinking. Creative and critical thinking are developed by used concept mapping methods and this claim has been supported by this research.

1.4 Lesson plan

The research has shown that student teachers developed questioning skills and applied these to their own lessons. They set questions to support higher order thinking. In Stage 3 (Cycle 2) student teachers used a variety of questions. Questions were developed step-by-step, leading from closed questions to the higher order open questions. Writing lesson plans enhanced questioning skills of student teachers as they also had to think about their own learning experiences and how they could apply in their teaching. Additionally, student teachers must plan and design the learning activities and to set good questions in their lesson plans. Student teachers needed to

prepare the questions about the content of subject as well as encourage school students' thinking. This is consistent with Dillon (1988, p. 98) who asserts that before asking questions, teachers must prepare the questions to ask and connect it to the lesson's purpose and content. Student teachers reflected on their lesson plans.

In addition, lesson planning is very important for being an effective teacher. Cole and Chan (1994, p. 101) suggest principles of lesson planning and preparation. There are four categories:

1. determining what to teach
2. planning how to teach
3. finding means to facilitate learning
4. getting organized.

The research supports the principles of lesson planning for both the student teacher and the university lecturer. The planning by the university lecturer structured the modeling of strategies but also provided a scaffold for the learning of student teachers. Student teachers practised being a teacher. They applied and designed learning activities. Planning lessons promoted student teachers to be effective teachers. Groundwater-Smith et al (1998, p. 155) say that successful teaching depends on effective planning. Hence, successful questioning depends on effective planning too. Lesson plans were an essential tool for enhancing student teachers' questioning and thinking skills.

1.5 Demonstration teaching

Student teachers set lesson plans and demonstrated teaching in university and school classrooms. They planned to teach individuals and in group work. Student teachers were required to write at least six questions in each lesson plan. This approach encouraged student teachers to practise planning questions. Marsh (1996, p. 122) suggests planning questions is strengthened through the following strategies:

1. Prepare a number of key questions which related to the purpose
2. Develop questions which encourage higher and lower order thinking
3. Ensure that the sequence of the key questions is logical to the students
4. Ensure that wording of the questions is clear and appropriate to the level of the students.

1.6 Learning log

Writing a learning log is the technique student teachers used to reflect on their learning and thinking. Student teachers used Bloom's Taxonomy as a framework for organising their ideas and reflecting on their own learning in the learning log. Student teachers wrote the ideas, feelings, changing ideas, thought and knowledge about processes and content of their learning (Wilson and Wing-Jan 1993, p. 85). In the Stage 1 (Cycle 1) and Stage 3 (Cycle 2) student teachers clearly developed learning and thinking processes. Some student teachers created the learning log by using concept mapping. Creative thinking was developed through writing the learning log. In addition, student teacher self-questioning was shown in the learning log. In their

study, Manning and Payne (1996, p. 194) state that self-talk encouraged learning and helped keep anger under control. Moreover, Manning and Payne say that...

'Self- talk for the affective domain is a means for directing ourselves to relate positively to ourselves and to others. Many of our feelings and attitudes are conditioned by the things we say to ourselves whether or not we even realize that we are talking to ourselves.'

Findings have shown that self-talk can be altered in adults and children to enhance lives and help solve annoying problems. Therefore the learning log was most appropriate to enhance student teachers' thinking processes and questioning.

1.7 Group-Self assessment

In the research student teachers were provided with a self-evaluation. They answered questions about what they had learned, how they felt, when they must ask a question, how they developed questioning and how they understood their ability for framing questions. As a group assessment, student teachers evaluated and gave feedback on teaching in the university and school classroom. They learned from and with each other. Phifer (2002, p. 48) suggests that feedback messages should be presented to promote positive, constructive interactions. Humans need and want interactions from others. This consideration of the thinking process is growth too. The benefits of group-self evaluation are in helping the lecturer to monitor change in reflection and metacognition. Furthermore, self-evaluation facilitated learning and development of self-knowledge. It assisted the student teachers with tools for raising awareness about

teaching and identifying problem areas. It ensures systematic and ongoing work for improving teaching patterns (Nikolic and Cabaj 2000, p. 19). As a result, group-self assessment promoted valuable ways and strategies for student teachers and university lecturer to learn and think.

2. The learning process

The learning process which the lecturer considered to enhance student teachers' questioning skill development was reflection and metacognition based on action learning and a constructivist approach.

Reflection and metacognition are approaches to promote student teachers' and the lecturer's inquiry learning. The strategies to promote reflection and metacognition were designed in the planning for each implementation. They were the learning log, concept mapping, questioning, self-questioning and self-evaluation. Student teachers were trained and reflected on their thinking. The strategies helped student teachers develop cognition, feeling and action (Johnson 1999, p. 347). Metacognition of student teachers was developed. Research by McInverney and McInverney (1998 cited in Bakopanus and White 1990, p. 99) shows that metacognition training promotes student learning. Additionally, Baird (2000) states the metacognitive perspective builds interrelationships among the ten key learning terms. These are perception, motivation, attitudes/emotions, challenge, reflection (and action), metacognition, volition, understanding, enjoyment and ignorance. Therefore,

reflection and metacognition should strengthen learning the university and school classroom.

Action learning was described in the research. The findings of the study show that student teachers have learned through action and experience (McGill and Beaty, 1995). This means they explored and planned how they would manage their own learning. Action learning is a process which focused on student teachers' awareness. They could apply theory into practice especially in learning to be teacher. This supported cognitive, affective and psychomotor (Brockbank and McGill 1998, p. 221). It reflected that the thinking process was developed. Wilson (2000) says that if thinking is to be improved, then it is argued that teachers must be the learners of the 'thinking process' too. This involved making learners aware of themselves as thinkers and how they process and create knowledge by learning how to learn.

The Constructivist approach is the procedure which was the basis for lecturer planning. The university lesson plans that the lecturer designed for implementation engaged student teachers in active and student-centred learning experience (Pappas and Tepe 2002, p. 25). In the Stage 1 (Cycle 1) and Stage 3 (Cycle 2) student teachers' inquiry learning is student-centred, which student teachers develop in collaboration with their peers. They shared ideas and experiences by brainstorming, questioning and discussion. The new paradigms of learning emphasize constructivism (Pappas and Tepe 2002). Here the learners were responsible their own learning. Furthermore, classrooms was independent and reflective support risk-taking.

3. The positive learning environment

The positive learning environment is important to support student teachers questioning and learning. In the research the reflection of student teachers showed that they were happy and enjoyed learning. The learning activities were challenging and enhanced them to think and question. The classroom climate of the university supported learning. It was friendly, supportive, relaxing, active and conducive to learning. In their studies Lang et al (1995, p. 82) and Phifer (2002, p. 17) assert that the learners learn best in a positive atmosphere. In the stages of implementation the lecturer created a positive environment which includes cognition, emotions and practice. Furthermore, the atmosphere provided and promoted student teachers' self-discipline. This finding is supported in the work of Moore (1998, p. 332).

4. The role of university lecturer

In the research the lecturer was a facilitator who guided student teachers' questioning. The lecturer was aware of Rogers who emphasized a humanist framework (Tauber 1995, p. 28; Purdie and Smith 1999; Phifer 2002, p. 47). The environment, procedures and learning activities were planned to motivate student teachers' learning. In addition, the lecturer provided feedback to promote self-evaluation of student teachers' choices. Implementing the action research for two semesters enhanced understanding of being the facilitator for the lecturer. The facilitator as a 'coach' was the model adapted for this research. This role focused on how, why and when student teachers learn questioning. Rogers (1995, p. 241) explains that the

facilitation of learning-how, why and when the student learns. Furthermore, Rogers (1995, p. 242) asserts that ...

'It indicated that if we are to have citizens who can live constructively in this kaleidoscopically changing world, we can only have them if we are willing for them to become self-starting, self-initiating learners. This kind of learner develops best, so far as we now know, in a growth-promoting facilitative relationship with a person.'

Thus if we want these learners, the university lecturer and school teacher must be a facilitator and realize the changing concept of teaching and learning. She should engage and motivate learners about how to process knowledge and learn.

5. The process of questioning

Findings of the study show that student teachers are happy and find questioning fun. They are self-confident to ask and answer questions. Questioning is appropriate and develops quickly when they enjoy learning. The questions of student teachers became more deep overtime. In addition, student teachers adapted questions to students' abilities in the school classroom. However, they need to practise more in the school classroom. In the research, the lecturer learned a great deal about the process of questioning in the university classroom. Student teachers were trained in questioning through careful university lesson plans. These started with simple questions and moved to higher order thinking questions. The lecturer studied and investigated suggestions of the educators such as Dillon (1988), Wilen (1991) and Moore (1998). The lecturer encouraged teaching of questioning through a variety of approaches. The

learning activities involved interactive teaching between the lecturer and student teachers, and student teachers with each other. Wragg and Brown (2001, p. 56) assert that most children and adults learn best when they are actively involved with each other and the materials. Moreover, a variety in questioning was also a valuable stimulus for active learning.

The findings of the study have shown that the lecturer facilitated questioning skills of student teachers systematically and effectively. The learning activities were set step-by-step. The activities were based on cooperative learning, Six Thinking Hats, creative thinking, critical thinking and concept mapping as well. The lecturer's lesson plans were guidelines through which the lecturer was focused in teaching and implementing an inquiry rich curriculum for two semesters.

The classroom environment was considered critical. It was warm and supporting. Student teachers always discussed, presented, set questions and answered questions and problem solving. They interacted through the learning activities. The lecturer and student teachers have learned with and from each other. In addition, thinking process was developed by both the lecturer and student teachers. Effective learning activities were a central focus for planning, teaching, observing and reflecting. Bloom's taxonomy was used between implementations to plan for the coming semester. Learning how to apply theory in teaching was an important professional development outcome. Enhancing the thinking process of the lecturer was also promoted from the beginning till the end of the research.

Student teachers were enhanced in their thinking processes through the learning activities. They learned to construct questions carefully and purposively for better thinking and metacognition. Bloom's taxonomy was considered the basic framework for the planning the learning process of student teachers. Student teachers practised questioning by using knowledge, comprehension, application, analysis, synthesis and evaluation focused questions. Moreover, metacognition was developed and used as well. They thought and reflected on what they had done and learned. Thinking processes were promoted at all the times in the university classroom.

One of the most important findings of this study is that two-way reflection on classroom learning, facilitated by a lecturer, serves to significantly enhance student teachers' questioning learning experience. Student teachers' construction of knowledge, theories of practice and how these develop for teaching, questioning and learning were explored. This construction informed not only student teachers' practice but also the lecturer's practice.

Two-way reflection on classroom learning involves:

1. Reflection for the learning of the lecturer
 - Learning about thinking process, facilitating teaching and improvement teaching through rich questioning practices
 - Learning enhanced student teachers questioning in university and school classroom.
2. Reflection for the learning of the student teachers

- Learning about metacognition, questioning and teaching skills
- Learning to reflection on strategies of the lecturer
- Learning to make explicit about their own feelings and attitudes about teaching and learning
- Learning to understand their relationship with the lecturer and how this relationship supports effective classroom climate teaching and learning learning.
- Learning to cooperate with student teachers and others
- Learning to teach in the school classroom.

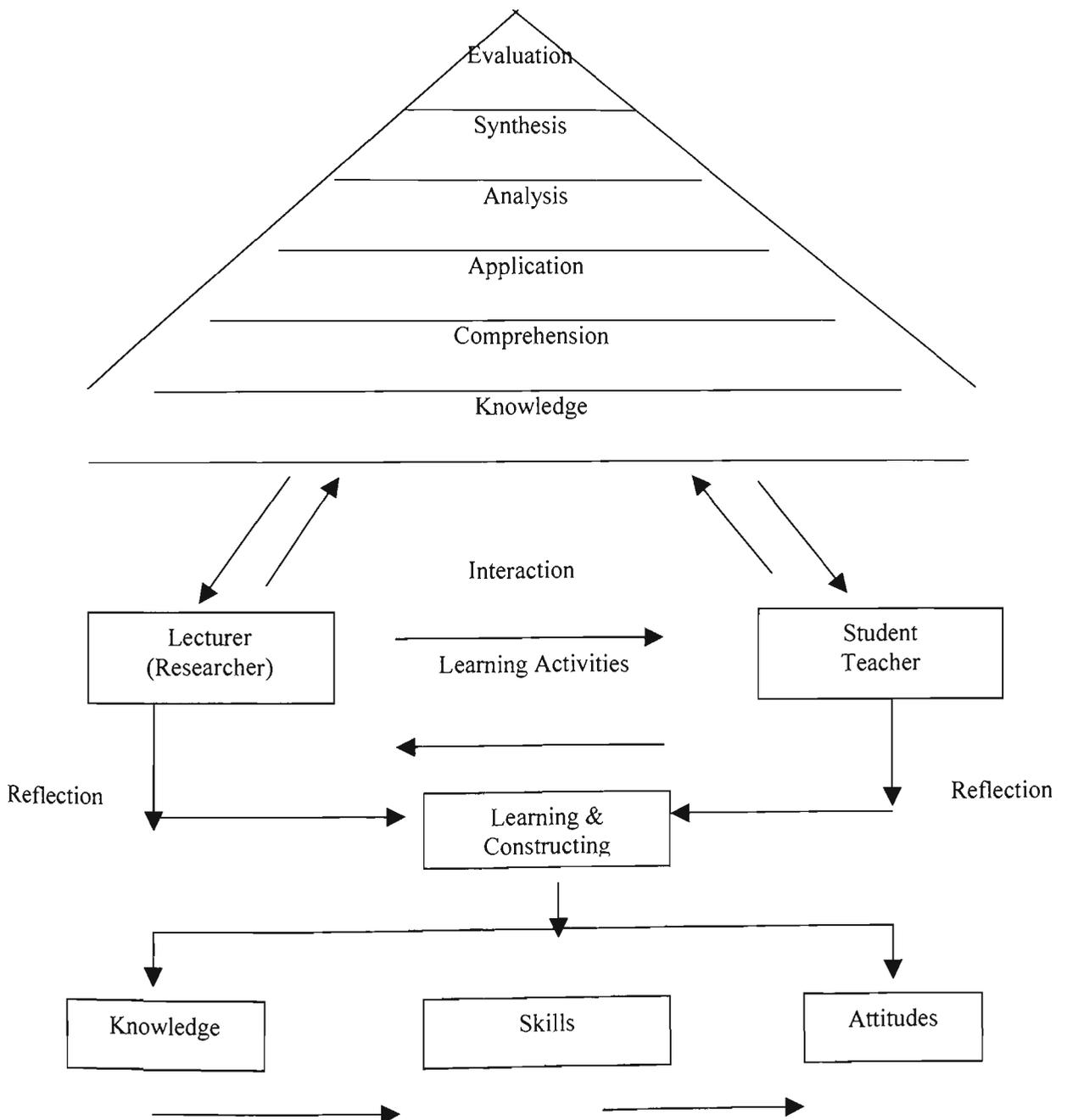
This reflection is very powerful for the university and school classroom. It encouraged the thinking process development of learners. The participation was developed in the learning process. Groundwater-Smith, Ewing and Cornu (2003, p. 166) state that the reflection process will be enhance by talking with others. Orlich, Harder, Callahan, Trevisan and Brown (2004 p.25) remind that...

'...Effective teaching involves dynamic interactions between and among teacher administrators, teachers and teachers, teachers and learners, and learners and learners, in which all participants are continuously making decisions- including that all important student decisions to embrace learning.'

Reflective classrooms build learning from past and current experiences. The process and results helped the lecturer plan to solve the problems and set the learning activities which promoted a humanist classroom (Rogers 1995). Student teachers and the lecturer learned to construct knowledge through learning in the university classroom together. Krause, Bochner and Duchesne (2003, p.167) explain that

'Constructivist approaches focus on the role of social interaction and on the impact of sociocultural factors on our ability to process information cognitively'. These processes led the learners and lecturer/facilitator to demonstrate thinking process development. The details above are shown in Figure 6.16 as they also relate to Bloom's Taxonomy of cognitive goals (Bloom 1956). The development is outlined from lower to higher order thinking skills.

Figure 6.16: Thinking Process Development Through Facilitating Questioning Skills



This study demonstrated that two way reflection supports effective teaching and learning. The lecturer and student teachers learned in the real situation both in the university and school classroom. Reflection must be purposively planned for in both the university and school classroom. This includes developing awareness of the ways of thinking and learning in the community. Two way reflection provides the basis for a new paradigm of teacher education in Thailand. The new paradigm can be extended to include developing awareness of and sensitivity to thinking, learning and relationships in the community.

Such a new paradigm will establish a foundation for tolerance and understanding through cooperative respectful inquiry in a culture that is challenged by the differences (dichotomy) of traditional Thai values, culture and modern western trends and influences. The new paradigm of university and school classroom learning and pedagogy should:

- value building skills for effective questioning in both teachers and learners;
- enhance reflective teaching and thinking process;
- interact between facilitator and learner, and learners and learners;
- encourage higher order thinking;
- promote cooperative learning between facilitator and learners and between learners and learners;
- be founded in the principles of humanist and constructivist classroom practices and education;
- promote learners to learn in and from real situations;
- develop knowledge, skills and attitudes;

- support teacher professional learning which models humanist and constructivist learning for teachers.

This research highlights the capacity of inquiry classrooms to develop skills for teachers and students. It provides new knowledge about what is possible in Thai teacher education and identifies the need for teacher education to explore the development of teachers' professional development that address teacher thinking and promotion of thinking process in the university and school classroom. Chapter 7 responds to this need based on this research and proposes a new paradigm of teacher education practice in Thailand.

Specific Issues Relating to Thai Education

Two-way reflection is one significant finding of the research. It is a valuable finding for both teachers and learners as a mechanism or supportive structure for improving their teaching and learning. The outcome of this research indicates that the two-way reflection in this project has serious implications for the reform of Thai education. This research found that the teachers need to reflect on classroom learning and to be able to benefit from this reflection in classroom teaching as an essential part of learning process. In so doing, both learners and teachers may learn together from different types of teaching-learning media and other sources of knowledge (Office of the National Education Commission 2000b). Reflection on practice is a relatively new concept to Thai teachers and teacher education and is not widely accepted as the powerful professional learning and improvement tool that this research demonstrated it to be.

The results of this research show that writing the journal and learning log enhanced thinking process and communication skills for the student teachers and in turn led to improvements in their planning and preparation for teaching in school classrooms. It is the valuing of approach drawn from the western education which promotes teacher metacognition. Unfortunately, Thai students were not previously trained in writing a learning log or journal in the university and school classroom. Hence, lecturers, student teachers, teachers and students should have opportunity to write journal or learning log as part of their own teaching and learning, to promote metacognition, change for improvement in practice and the generation of critique of practice. This strategy enhances the knowledge, experiences and feelings which are recorded through thinking then writing, reflection and considering resulting new ideas and understandings.

The notable changes in student teachers between cycle 1 and cycle 2 are strong evidence of their questioning skills development. This is also evidence that while Thai education has not fully embraced student centred learning, significant achievement is possible in a very short time when there is a distinctive focus on change in a positive learning environment and where the supportive action learning and two-way reflection is embedded as part of the teacher professional learning program.

Teaching and learning approaches which were involved in this research assisted student teacher questioning and encouraged them to higher order thinking in both lecturer and student teachers and in a very short time relatively. Much more is possible with a determined focus and a resource system which enables teacher

educators to lead a country wide development of inquiry based learning and student centred pedagogy.

Chapter 7

Re-thinking Teacher Education Practice in Thailand.

This research has investigated the development of the teaching of questioning in teacher education in Thailand. This development has been based on the application of action learning and most critically the engagement of reflective practice for the development of student teachers professional learning. The research has shown that the teaching of questioning has changed for both student teachers and the lecturer and that this has impacted both the pedagogy of the school and university classrooms. In addition, it has highlighted some practices which support learning and questioning development in both university and school classrooms. This chapter proposes approaches to teacher education which support and model the type of practices proposed for school classrooms under the Thai Education Act. It is critical that the shift in university learning approaches occur if there is to be significant change in the learning of school students.

In reviewing the research and its findings it is important to contextualise the research within Thai education system and practices. Bloom and de Bono have been chosen as guiding theorists in the development of strategies for improving teacher education and ultimately school classroom practice because they have developed their approaches

with the purpose of improving and enhancing inquiry and democratic classroom practice. This is consistent with the goals of Thai education reform. While it can certainly be argued that the western education systems in which they are founded may still be far from inquiry based or democratic in nature, indeed, they have shown to provide essentially useful strategies and philosophical underpinnings for teachers setting out on the journey for pedagogical reform as is the case in Thailand.

This research has shown explicit formulations of the ways in which Thai student teachers are expected to be changed by the education process. This is, the way in which they have changed in their thinking, their feeling and their action (Bloom, 1956, p. 26). It is desired that as the result of completing an educational unit, the student teachers will be changed with respect to the amount and kind of knowledge. Frequently knowledge is primary. It means that the student teachers can give evidence that they remember, either by recalling or by recognizing some ideas or phenomena with which they had experience in the educational process. These are the processes of surface learning. In this study, student teachers applied their knowledge of learning and teaching in both the university and school classroom. Moreover, student teachers analyzed, synthesized and evaluated their own practice, most particularly their questioning, teaching strategies and professional learning. These are indicators of deep learning (Biggs and Moore 1993, p. 332).

The reflection of the student teachers showed that they have positive understanding about their learning. They are happy and enjoy learning activities. They felt positive thoughts about and their learning. The learning environment contributed to enhance

their learning. They always said *'It is very fun'* *'I am so proud....'* These are indicators that they have learned in action in the classroom. This relates to Myers (1996, p. 131) who suggests that attitudes and actions sustain each other. Moreover, the approach taken in the university classroom was significant in motivating student teachers. Some student teachers were sorry when they did not send their learning log on time. The university lecturer and student teachers agreed before starting the course that the learning log will be sent after two days after learning in the university classroom. Some student teachers said

'I am so sorry, I forgot to send my learning log.'

'Let me send my work tomorrow.'

'I am sad, I sent my learning log late.'

'I try to send the learning log every week.'

Additionally, some student teachers were absent from university classroom and wrote a letter about absence. Student teachers realized their responsibility and the opportunities they were missing. Two semesters of teaching and the documentation of and reflection on the work through the research promoted student teachers to be more effective teachers. They learned problem solving and decision making. This was a teaching goal for the courses. They learned to plan and work systematically. They applied the knowledge and experience from the classroom to the real life; from the university classroom to the school classroom.

These findings relate to Kyriacou (1998, p.1) who explains the art of successful teaching is thus crucially bound up with developing both decision-making skills and

action skills. Teaching is as much a thinking activity as it is observable actions.

Clark (1995, p. 8) suggests that ...

'good teachers must not only know how to manage, give feedback, make practical plans and wise decisions. They must be more than performers, more than thinkers. The good teacher must also be a practical scholar, a student of the academic disciplines, and a fluent translation. The good teacher becomes a life-long learner of subject matter and of ways to represent it.'

In this study student teachers practised teaching and questioning at university and school classroom and in so doing, also developed creative presentations for both their peers in the university classroom and for their own students in schools. In the Stage 1 (Cycle 1) and Stage 3 (Cycle 2) student teachers worked in pairs or group work. They planned and created presentations. Moreover, they planned to teach, to develop appropriate questions individually and through group work. Student teachers have learned to present and set questions in the learning activities. Practical questioning and teaching enhanced student teachers' knowledge about how to set questions and to reflect on their teaching skills. They were self-confident in questioning and teaching. Questions reflected higher order thinking. Lesson plans were clear and based on sound planning. Student teachers have learned to comment and give positive feedback to each other. Teaching and questioning of student teachers was developed more and as Kyriacou (1998, p. 2) asserts, teaching skill was improved by training and practice.

During and because of the research, the lecturer improved her professional practice. The lecturer learned to develop the teaching of questioning and reflective practice for the development of teaching competence. As well, the lecturer designed learning activities systematically and implemented change for improvement in practice. Hence, the research found that planning, reflection, improvement and implementation of the lecturer's teaching and learning in questioning and thinking process development. It has resulted in strong professional growth. According to Lang et al (1995, p. 10) there are five areas of professional growth. They are personal development, knowledge of subject matter, teaching procedures, interpersonal communication and level of conceptualization. All these were influenced by the research through planning critically for more successful teaching.

Initiating Inquiry Based Learning in Thai Education

Setting up questions is an essential teaching skill and it is the foundation for teacher effectiveness to promote thinking processes in their students. The teaching strategies of the lecturer were generated by asking key questions, searching for possible answers, studying model solutions and organizing the best plan of action. The classroom climate was friendly. The lecturer managed the university classroom based on an understanding the concept of participatory democracy through a community inquiry. Student teachers were supported to think and discuss in the learning activities. Cooperative learning, group process, Six Thinking Hats, concept mapping and constructivist are very important for increasing student teachers' questioning skills and their participation in a democratic classroom (Wilks 1995; Pearl and Knight

1999; Cherednichenko 2001; Fisher 2003). The classroom climate, student teachers feel good about themselves and become caring and supportive of one another.

Reflecting at the end of the study, it is clear that there is a need to explore and answers to some questions for guiding Action Research according Kember and Kelly (1993, p. 11) who suggest as follows:

1. How effective were changes?
2. What has been learned?
3. What were the barriers to change?
4. How can this research inform change for future improvement?

In the Stage 3 (Cycle 2) the changes are revealing. Student teachers were encouraged to apply questioning for deep understanding. The questions set supported higher order thinking. Student teachers practised teaching and questioning in school classrooms. Reflection of student teachers indicated that they developed their thinking process and questioning. Changes were made in Stage 3 to enhance effective learning. In the Stage 3 (Cycle 2) the learning activities included higher order thinking activities such as problem solving, decision making, critical thinking and creative thinking (Wilson 2000). The changes were effective in promoting higher order thinking.

The influence of coaching on the quality of learning has been demonstrated in this research (Loughran 2002,p.10; Pappas and Tepe 2002, p.26, 35; Jepperson 2002, p.113). Careful planning could ensure that good teaching and coaching and the

freedom to respond to student teachers' learning helped the lecturer and student teachers to encourage a deeper approach. Analytical thinking pushed towards a new project design from the theoretical framework notably planning considering Bloom's Taxonomy for building higher order thinking. The lecturer learned to adapt and developed reflective practice for development of teaching competence. Furthermore, the lecturer learned to be a good facilitator. The lecturer must be supportive, affirming, encouraging and enthusiastic. The lecturer must demonstrate and guide student teachers through the reflective process. The facilitator is competency must be not only in advising, which involves giving suggestions, informing and explaining but in addition, the lecturer learned to explore the process of teaching through the action research. As a results, a new program was provided helping student teachers to learn how to learn and also leading them towards the Thai government goal. We have learned together, from reflection on the university and school classroom learning.

There were several barriers to change. One of the barriers to change was how the lecturer motivated student teachers to question. Learning to be a good facilitator is also very significant. The lecturer must be patient, creative and critical for problem solving in the university and school classroom. Other barriers to change are obstacles to student teacher learning. The factors limiting adult learning are past experience, the learner attitude, time management and adaptation ability. These obstacles for student teachers led to them being closed to learning. Consideration and analysis of these obstacles was defined as problem solving before class activities. In addition, student teachers require more practice in school classrooms and also practice in analyzing the level of questions. Finally, the lecturer should be aware of the

conditions of learning and principles of teaching to reduce obstacles for the learners which Knowles (1984, pp. 83-85) has concluded as the role of the andragogical teacher:

- *The teacher exposes students to new possibilities of self fulfillment*
- *The teacher helps each student clarify his own aspirations for improved behavior.*
- *The teacher helps each student analyse the gap between his aspiration and his present level of performance.*
- *The teacher provides physical conditions that are comfortable.*
- *The teacher accepts each student as a person of worth and respects his feelings and ideas.*
- *The teacher involves the students in a mutual process of formulating learning objectives in which the needs of the students, of the institution of the teacher, of the subject matter and of the society are considered.*
- *The teacher and learner share thinking and responsibility planning the designing of learning experiences.*
- *The teacher helps the learners to organize themselves to share responsibility in the process of mutual inquiry*
- *The teacher supports the learning experience of students through many techniques such as discussion, case method.*
- *The teacher helps the students to apply new learning to their experience, and makes the learning more and integrated.*
- *The teacher helps the students develop and apply processes for self-evaluation according criteria and methods for measuring progress*

toward the learning objective.'

Understanding the role of the teacher as a set of principles for teaching based on conditions of learning helps the lecturer develop a better understanding of the education process and learning process.

Recommendations

What should teacher education in Thailand look like?

Teaching is an honored profession for the future of the country (Phifer 2002, p.1).

Calderhead and Shorrock (1997, p. 1) state that...

'... Educational thinkers have variously emphasized different aspects of the teaching role-the teacher as expert in their subject; the teacher as facilitator of learning; the teacher as a motivator and source of inspiration; the teacher as upholder of moral standards.'

Recent educational reform in Thailand, and changing world reform in teacher education are the basis for teacher education in Thailand . The critical elements in teacher education in Thailand are:

The curriculum design

- Promote student teachers to develop to their fullest potential
- Develop student teachers who can manage and facilitate life-long learning

- Identify the knowledge base and conceptual skills needed for student teachers to be managers and facilitators
- Promote student teachers to develop higher order thinking, such as metacognition, creative thinking, critical thinking, problem solving and decision making
- Enhance essential skills for being effective teacher such as questioning skills
- Emphasize professional experience
- Assess student teachers through development and performance.

Characteristics of lecturer in the reforming era:

- To be facilitator and researcher
- Focus on the constructivist learning and emphasize a humanist framework
- Be aware of on-going reflective practice and self-development for professional development.
- Collaborate to enhance practice
- To be a learner as the basis for effective facilitation of life-long learning
- To be good model of facilitating learning.

Characteristics of student teacher in the reforming era:

- To be an active learner
- Possess appropriate and updated body of knowledge
- Acquire good transactional skills
- Love being a teacher and have good attitude towards teaching profession
- Have an effective essential skills of being teacher such as questioning skills and thinking skills
- Be aware of on-going reflective practice and self-development
- To be a good thinker and developer
- To be a learner to facilitate, student file-long learning
- To promote school classroom on thinking process development.

The atmosphere in the Faculty of Education

- Prepare the classroom atmosphere, environment as a learning organization
- Prepare the atmosphere, environment and materials that promote learning
- Provide source and materials for autonomy learning
- Have a Center to promote thinking and learning, such as 'Thinking Center' and 'Self-Access Learning Center'.

Suggestions for further studies

- To follow up questioning skills of student teacher with practicum in the school
- To explore questioning skills of teachers in school classroom
- To investigate the process of questioning and answering of school classroom
- To investigate other essential skills being effective teacher
- To be cooperative action research.

The recommendations of this research support a changed for teacher education and a new paradigm of teaching and learning which focuses on developing thinking process and approaches to encourage student teachers' learning and reflection.

New Paradigm for Thai Education

The findings of the research shows that learning how to question and the thinking process development in this Thai context supports the National Education Act 1999. The research supports a dramatic shift in teacher education learning practice and proposes a new paradigm for teacher learning which centres on two way reflection. This emerging paradigm is the outcome of the reflection of work experience of the lecturer and student teachers in the university and school classroom. The trend of teaching thinking and thinking process development involves interaction between the

facilitator and the learners. Student teachers should be encouraged to set questions through action learning in the university classroom.

The staff members of education faculties should be made aware of the need to change the paradigm of teaching in the university classroom. The lecturer in this study is a learner and facilitator who supports student teachers to learn to think, analyze and solve problems. There are many strategies which were provided in the curriculum that were designed for developing student teachers' questioning. Teaching thinking is very powerful in the changing world and for education reform. The lecturer should change the ways of traditional thinking which is based on judgment and move to be creative and enhance and encourage constructive thinking. The design of this thinking process development program should put things together to deliver value and should be practised in the university and school classroom.

The university and school classroom should be made a democratic classroom (Pearl and Knight 1999). The lecturer and school teacher should be open minded, flexible and encourage learners to engage in cooperative learning. In the university the student teachers can think for themselves and solve actual problems. The learning approaches provide alternatives for problem solving. Moreover, the learning activities should enhance student teachers to think creatively and reflect analytically. Hence, the university classroom should be learner-centred and the university classroom climate should promote active learning. Student teachers need to discuss the ideas, questions and answers. In addition, the new paradigm for teaching, learning and development thinking process is based on questioning and two way reflection.

Questioning promotes higher order thinking which is the essential skill for being a teacher. Some student teachers in this study reflected on their thinking in another class in the university classroom and noted that they did not get opportunities to ask and answer questions. The lecturers only lectured the content. The strategies of teaching did not encourage student teachers to think. Furthermore, some of the lecturers believe that they are already teaching thinking and that thinking is not considered important.

Based on the questioning effectiveness research, essential teaching skills which specify the ability that all student teachers should possess have been identified. Questioning is an essential teaching skill and requires high level of awareness from teacher and student. The teaching and learning in higher education focus of the Faculty of Education should be to enhance essential questioning skills. Hence, the influence of teaching questioning skills with student teachers is a concern for the university lecturer who needs to be aware of how to:

- motivate student teacher to be an active learner;
- support student teachers self-confidence;
- be supportive;
- have good relationship in the university classroom and outside the university classroom;
- facilitate cooperation between the lecturer and student teachers, student teachers and student teachers, the student teachers and school students, and the student teachers and school teacher;

- be open-minded and provide student teachers with the opportunity to ask questions;
- allow the time for discussion and questioning because thinking process development takes time;
- be a counselor of student teacher in academic skills and problem solving in the real life situations;
- provide some times for student teachers to talk, ask questions after class;
- encourage student teachers to be tolerant and to seek understanding from inquiry
- apply a range of approaches to develop questioning and thinking skills.

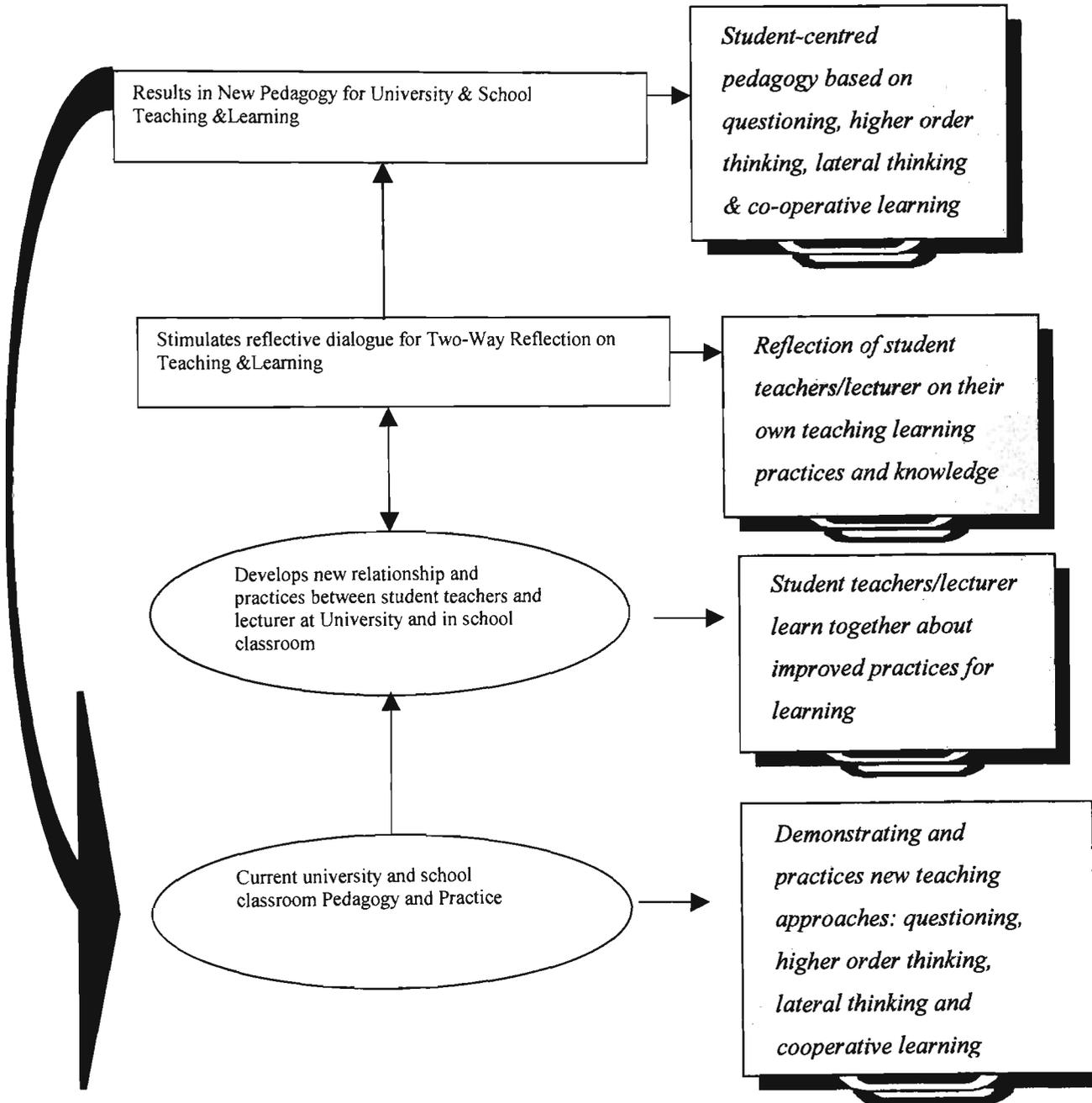
A significant obstacle to teaching questioning in the Thai context of the university and school classroom involves the context of the Thai culture. In the society and family, the children must respect the adult and they do not argue or express their thinking. Hence, the thinking process development will not easily continue from university and school classroom into society. It is this learning which can potentially be seen as a cause of conflict and will need time to develop. Teacher education for effective teaching must promote student teacher tolerance and understanding through cooperative respectful inquiry about Thai culture. Student teachers must learn to apply the theory of teaching questioning based on western traditions in the Thai context. The student teachers and school students learn discussion and questioning techniques in school which are different from their real life especially their life at home. Some parents do not understand the learning process and thinking process development in changing world. Hence, there are some arguments which challenge

the university lecturer, school teacher and student teachers as they adapt learning approaches to the development of a community of inquiry which also supports tolerance and understanding.

Developing the principles of a democratic classroom is a way to enhance student teachers understanding of learning activities focus on teaching questioning. Student teachers need to be patient listeners and argue thinking in appropriate ways. The lecturer should provide the new paradigm of learning in the university classroom and prepare student teachers for a new role with different characteristics which are now required. It is very important to prepare student teacher to learn to understand the process of humanist and constructivist learning in practice. They should learn to integrate theory as a central component of action learning. Student teachers should be eager to learn continuously throughout their life. Two way reflective practice is an appropriate approach to encourage both the lecturer and student teachers in professional development. The following model demonstrates the relationship between questioning, teaching, learning and two way reflection for a new paradigm for Thai university and school. The detail of new paradigm for teacher education and school teaching is shown in Figure 7.17.

Figure 7.1 New Paradigm for Teacher Education and School Teaching

NEW PARADIGM FOR PEDAGOGY IN TEACHER LEARNING



Essential principles for the new paradigm

To effectively implement the Thai National Education Act 1999, it is critical that the university lecturers change the way they work. This research revealed a process and

set of practices for achieving successful change. This research proposes four essential principles for teaching education pedagogy of the future.

1. University teaching is planned to reflect higher order thinking and to develop lateral thinking.
2. University learning uses questioning to create a pedagogy which is interactive, cooperative learning, involves lateral thinking such as Six Thinking Hats, strengthens higher order thinking (Bloom 1956), supports dialogue and metacognition about student teacher learning.
3. Student teachers plan for practice teaching with school students and this reflects the model of development experienced in the university classroom. That is, it uses questioning to create an interactive inquiry classroom for higher order thinking and lateral thinking.
4. Two way reflection on practice involves questioning and dialogue about teaching and learning by both the university lecturer and student teachers. This two way reflection is structured through a student teacher learning log and lecturer's journal. Reflective dialogue then supports critique and analysis of teaching practice which leads to recommendations for improvement and informs new lesson planning for both the university and school classroom.

This research builds on the work of Calderhead and Shorrock (1997) who argue that reflection is a critical element in effective teacher learning. The participants in this research went further than simply engaging in reflection on practice. They developed their own critical inquiry skills and capacity by practising strategies for lateral thinking about practice. They demonstrated that when student teachers and their

lecturer engage in two way reflection on practice which has been designed to support questioning, higher order thinking and co-operative learning, that the reflection is focussed on improving their own teaching in school classroom. The learning processes of the student teachers through reflection, as indicated in the lecturer's journal and learning log showed that reflection is the best way to develop teachers to be effective. Reflection helped the lecturer and student teachers learn how to plan and implement improved teaching approaches. Moreover, thinking processes were also developed.

This study supports Schön (1983) and Brockbank and McGill (1998, p73) who suggest that reflective practice promotes critical thinking. In addition, O'Reilly et al (1999, p.21) assert that reflection-on-action helps learners learn from experience. Reflective practice in the research is reflection-on-action in the university and school classroom. The role of the lecturer is as the facilitator who encourages student teachers questioning, reflective practice, higher order thinking, and cooperative learning. The learning activities enhanced deep learning of student teachers. The findings build on the work of Biggs and Moore (1993) and Pappas and Tepe (2002).

This study offers approaches for effectively developing the questioning skills of student teachers, especially in the Thai education context of education reform. The learning activities challenged and motivated the learners to improve and engage in questioning. The results showed student teachers developed questioning and higher order thinking. Hence, the learning enhanced questioning and thinking process.

The classroom environment is very important for reflective questioning. This research showed the university classroom atmosphere is warm and supportive. Lang et al (1995) and Brekelmans et al (2000) say that effective classroom management promote learners learns as inquiring an active learner.

The lecturer and student teachers learned to develop personally and professionally. This study showed the reflective practice based on Rogers' humanist framework. Student teachers demonstrated teaching in the university and school classroom. Student teacher investigated the good classroom management and the development of thinking classrooms building on the work of Tishman et al (1995) who suggest a language of thinking vocabulary is essential to help teachers manage classroom learning.

The context of educational reform in Thailand means that student teachers need to be trained in questioning skills through reflective dialogue. Reflection through the learning log is powerful. This approach enhances metacognition, creative and critical thinking. These ideas support the work of Ormrod (1998 pp.348-349) and Woolfolk (1998, P.267, p.282) who assert that metacognition helps learner become strategic learners and thinkers.

To be able to be a good teacher, it is important to be a lifelong learner as well, especially in the development of personal thinking processes. Student teachers must engage in reflective practice and absorb the learning approaches and models of teaching in the university classroom and apply these in the school classroom.

Questioning and thinking skills must be an essential part of the education of beginning teachers. The participants in this research were able to develop questioning skills and higher order thinking through action research. The findings support the research of Chandhaket (1983) who has shown that the questioning of teachers could trigger thinking of learners.

Two way reflection on teaching and learning is a new paradigm for pedagogy in teacher learning in educational reform in Thailand. The new paradigm supports the teacher and learners in learning how to learn. It is very powerful to enhance the university lecturer, student teacher, school teacher and school student thinking process development and life long learning.

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Appendix A
Lesson Plan “General Methods of Teaching”

Faculty of Education Burapha University
Department of Curriculum and Instruction
Subject 404361: General Methods of Teaching
Subject Leader: Roongfa Kitiyanusan

Course Description

This course will develop an understanding of the educational goals, curriculum in school, the nature of learning and teaching process, models of teaching, classroom management and practicum in teaching.

Aims

1. To clarify the educational goals, curriculum in school, the nature of learning and teaching process, models of teaching and classroom management
2. To introduce lesson planning and lesson plan format
3. To provide an opportunity for student teachers to review their learning from the subject
4. To engage in practice teaching in the university classroom
5. To promote learning and teaching for teacher profession
6. To promote a positive attitude towards work.

Activities

1. Lecture
2. Discussion
3. Video of model of teaching
4. Self study
5. Practicum writing lesson plan
6. Practicum teaching.

Assessment**Individual work** 30%

- Writing a learning log 10%
- Writing lesson plan 10%
- Teaching demonstration 10%

Group work 20%

- Report and presentation about curriculum in school 10%
- Group teaching 10%

Final examination 50%**Recommended Reading:**

Eggen, P.D. & Kauchak, D.P. 1996, *Strategies for Teachers: Teaching Content and Thinking Skills*, 3rd edn, A Simon & Schuster Company, U.S.A.

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Lesson Plan 1

Course 404361 General Methods of Teaching

Date..... Time.....

Aims

1. To clarify the course
2. To clarify the assignment and how it might be undertaken.

Objectives

By the end of the class, student teachers will be able to:

1. explain the details of course by questioning and answering
2. set up yes-no question focus on course 404361.

Content

Course Syllabus 404361

Learning activities

1. The student teachers introduce themselves by drawing pictures on their name cards.
2. The picture can represent anything they would like to share with the class.
3. Each student teacher presents their name cards, and lecturer asks a question.
(30 minutes)
4. Orient the course, activities and assignments by allocating student teachers to read the course syllabus 404361. (20 minutes)
5. Each student teacher asks yes-no questions and lecturer answers questions. (30 minutes)

(Break for 10 minutes)

6. Student teachers work in pairs discussing and concluding the course. Then the pairs create some new yes or no questions which lead to only yes answers and write those new questions on cards. (20 minutes)
7. Ask student teacher to volunteer to present questions and answers. (30 minutes)
8. Collect cards.

9. Student teacher writes the plan of learning which could lead them to the set goals (10 minutes)

Resources and materials

1. Course Syllabus 404361
2. Name cards / cards
3. Crayons.

Evaluation

- Observation
 - Set up questions
 - Answer questions

Assignment

- Read National Education five Act B.E. 2542 (1999) for the next lesson
- Students form group of five.

Group 1 searches for information on curriculum in primary school in 1990

Group 2 searches for information on curriculum in junior school in 1990

Group 3 searches for information on curriculum in high school in 1990

Group 4 searches for information on curriculum basic education in 2001

Prepare for presentation on the 4th week.

Lesson Plan 2

Course 404361 General Methods of Teaching

Date..... Time.....

Aims

1. To consider the details of National Education Act which focus on National Education guidelines
2. To clarify the meaning of education
3. To clarify the educational goal.

Objectives

By the end of the class student teachers will be able to:

1. explain the National Education Act by using closed questions
2. describe meaning of education and educational goal
3. set up questions on learning topic.

Contents

1. National Education Act
2. National Education Guidelines
3. Education
 - Meanings
 - Goals

Learning activities

1. Lecturer writes down questions (closed questions) about National Education Act. Each card contains only one question. The number of questions is equal to half the number of students in class.
2. Lecturer writes down the answers for the questions in No. 1 on the cards. Each card contains only one answer.
3. Give out one card to each student teacher. Explain that this is a matching exercise. Some student teachers have questions and others have the answers. (20 minutes)
4. Have student teachers find their matching cards. When a match is formed, ask the matching student teachers to find seats together.

5. Then each pair quizzes the rest of class by reading aloud their question and challenging their classmates to answer the question. (30 minutes)
6. Discuss and conclude on National Education Act. (10 minutes)
7. Discuss on meaning and educational goal. (20 minutes)

(Break for 10 minutes)

8. Divide the student teachers into five groups. There are four student teachers in a group. (60 minutes)
9. Ask student teachers on question,
“How do teacher facilitate students on classroom learning?”
10. Make the mind map, draw pictures and present it to class. Lecturer asks some questions.
11. Conclusion on learning

Resources and materials

1. Index cards
2. Transparencies (National Education Act, Education goal)
3. Paper
4. Crayons

Evaluation

- Observation
 - set up questions
 - answer questions
 - group work
 - oral presentation

Assignment

1. Questions for student teachers as follows :
 - What have you learnt?
 - What do you still need to find out?
2. Assign student teachers to write answers on learning log.

Lesson Plan 3

Course 404361 General Methods of Teaching

Date..... Time.....

Aims

1. To enable the student teachers to understand learning process
2. To enable the student teachers to understand relationship between learning and teaching
3. To develop a sense of questioning.

Objectives

By the end of the class student teachers will be able to:

1. explain learning and teaching process by questioning and answering
2. discuss learning and teaching
3. set up open questions on learning content
4. set up rhetorical questions
5. answer questions on learning content.

Content

1. Learning
2. Learning process
3. Teaching process
4. Learning and teaching.

Learning activities

1. Divide student teachers in to 4 groups
2. Students survey the surroundings of the Faculty of Education, Burapha University as directed in the activity sheet (15 minutes)
3. Brainstorm and discuss the environment problems. Student teachers write up a project to solve problems (25 minutes)
4. Oral presentation (20 minutes)
5. Lecturer asks open questions and rhetorical questions to relate the survey to the learning and teaching. (10 minutes)

6. Lecturer presents some transparencies and results of class discussion on learning.
(20 minutes)

(Break for 10 minutes)

7. Evaluate on contents of learning, learning process and learning and teaching.
Three open questions are placed on each student's teacher back. Each student teacher asks three people to read it and records their answers. (20 minutes)
8. Each question is read and student teachers tell the class of answering. (20 minutes)
9. Lecture concludes the lesson by calling student teachers by random sampling from name cards to answer the following questions : (10 minutes)
- What were the benefits of environment survey?
 - How can you teach students how to learn?
 - How do you apply learning activities to your teaching?

Resources and materials

1. Environment of Faculty of Education, Burapha University.
2. Work sheet
3. Transparencies
4. Question cards
5. Name cards

Evaluation

- Observation
 - class activities
 - set up open questions

Lesson Plan 4

Course 404361 General Methods of Teaching

Date..... Time.....

Aims

1. To consider curriculum in primary, junior and high school
2. To provide an opportunity for student teachers to set questions
3. To propose ways that the class might engage questioning and answering

Objectives

By the end of the class students teachers will be able to:

1. state the main questions to be discussed in curriculum in school
2. encourage thinking about questioning and answering
3. develop questioning skills of student teachers.

Content

- Curriculum in school
 - Primary school in 1990
 - Junior school in 1990
 - High school in 1990
 - Basic education in 2001

Learning activities

1. The student teachers (4 groups) present the details of curriculum in primary school, junior school and high school. They are principles, frameworks, goals, subjects, activities and evaluation
2. The model of presentation is interviewing. Some student teachers act as interviewers and interviewees by focusing on their report topics. (Each group has 25 minutes)

(Break time after the second group finish, 10 minutes)

3. Student teachers in classroom record the gained information and prepare questions to ask the speakers by writing on cards. (Each group has 10 minutes)

4. Lecturer random some student teachers ask questions each group.
5. Conclusion and collect cards.

Resources and materials

1. Work sheets on curriculum
2. Transparencies
3. Reports of students teachers
4. Cards

Evaluation

1. Observation
 - presentation
 - set up questions
2. Reports
3. Checking questioning.

Assignment

- Student teachers self-evaluation 1st
- Read sheet about writing objectives

Lesson Plan 5

Course 404361 General Methods of Teaching

Date..... Time.....

Aims

1. To provide valid reasons for stating instructional objectives
2. To clarify the nature of main objectives and subsidiary objectives
3. To have students practice writing main objectives and subsidiary objectives.

Objectives

By the end of the class student teachers will be able to:

1. explain what they have read about instructional objectives
2. write main objectives and subsidiary objectives
3. initiate questions on instructional objective

Content

- Main objectives
- Subsidiary objectives

Learning activities

1. Divide student teachers into 7 groups. (One group has 3 student teachers)
2. Review reading material sheet about objectives. (10 minutes)
3. Each group works as follows : (30 minutes)
 - The first student teacher sets up question
 - The second student teacher answers question
 - The third student teacher takes note
4. Take turn to work in each role until everyone has a chance to work in every role.
5. Conclusion and discussion by transparencies. (30 minutes)

(Break for 10 minutes)

6. Student teacher does exercises about objectives
7. Lecturer asks questions and discuss answers by random name cards
8. Student teachers practice writing objectives (group work). (20 minutes)
9. Share idea and discuss the objectives. (20 minutes)

10. Have students volunteer to ask questions to form a condition of the lesson.

(10 minutes)

Resources and materials

1. Sheet
2. Transparencences
3. Exercises

Evaluation

1. Observation
 - group working
 - set up questions
2. Writing objectives
3. Exercises

Assignment

- Bring learning logs to class in the next lesson for sharing and partner feedback
- Each student teacher writes main objectives and subsidiary objectives

Lesson Plan 6

Course 404361 General Methods of Teaching

Date..... Time.....

Aims

1. To consider foundation of teaching
2. To promote learning about teaching skills
3. To engage in a simulation regarding professional learning.

Objectives

By the end of the class student teachers will be able to:

1. describe foundation of teaching
2. state essential teaching skills
3. Answer and ask questions on essential teaching skills
4. Provide feedback on learning log.

Content

1. Foundation of teaching
2. Essential teaching skill

Learning activities

1. Lecture and have a discussion on foundation of teaching. (20 minutes)
2. Student teachers volunteer to simulate good teaching skill and bad teaching skills. Then lecturer asks questions by random name cards of student teachers. (30 minutes).

(Break for 10 minutes)

3. Student teachers study good model of teaching of model teacher. They search for information at the library of Faculty of Education, Burapha University. Take notes and discussion. (40 minutes)
4. Lecturer sets questions and ask students randomly. The questions focus on the following :
 - Knowledge
 - Comprehension

- Application
 - Analysis
 - Synthesis
 - Evaluation (20 minutes)
5. Each student teacher sets a question on card by focus on her studying the good model of teaching of model teacher. Then lecturer asks questions by random name cards. (20 minutes)
 6. Conclusion and discussion. (20 minutes)
 7. Student teachers work in pair. Give feedback on his/her partner' learning log. Write feedback on learning log. (10 minutes)

Resources and materials

1. Sheet
2. Library
3. Name cards
4. Question cards

Evaluation

1. Observation
 - answering
 - questioning
2. Learning log

Assignment

Answer questions and write on learning log

1. How do you feel about questioning?
2. What questions and answers that you set in the classroom.

Lesson Plan 7

Course 404361 General Methods of Teaching

Date..... Time.....

Aims

1. To consider teaching strategies
2. To encourage learning teaching
3. To promote discussion on the quality of teaching.

Objectives

By the end of the class student teachers will be able to:

1. state the main questions to be discussed in teaching
2. develop and questions related to the practice of teaching strategies and answer them
3. question about Six Thinking Hats on learning topic.

Content

1. Teaching strategies

Learning Activities

1. Watch video of teaching strategies. (40 minutes)
2. Answer some questions from work sheet. (30 minutes)
3. Discuss teaching strategies on the following aspects: communication, reinforcement, questioning, materials and evaluation. (20 minutes)

(Break for 10 minutes)

4. Discuss Six Thinking Hats. The colour of each hat depicts a particular type of thinking. (10 minutes)
5. Conclusion by each student teacher selects a coloured hat and then set a question about learning from video designated by the colour of their hat on a card. (20 minutes)
6. Student teachers were chosen by random their name cards to read and answer Questions from the fifth learning activities. (20 minutes)

Resources and materials

1. Video
2. Work sheet
3. Colour cards (6 colours)
4. Cards
5. Name cards

Evaluation

1. Exercise from work sheet
3. Observation
 - discussion
 - set up questions

Assignment

- Each student teacher sets questions about Six Thinking Hats on learning topic in learning log.

Lesson Plan 8-9

Course 404361 General Methods of Teaching

Date..... Time.....

Aims

1. To provide an opportunity for student teachers to group teaching.
2. To engage in a simulation involving professional learning.
3. To involve students in a simulation regarding role play and professional learning.

Objectives

By the end of the class student teachers will be able to:

1. describe strategies for teaching
2. demonstrate group teaching
3. set up questions for undertaking situational analyses Six Thinking Hats
4. answer questions for undertaking situational analyses Six Thinking Hats

Content

Teaching strategies

Learning Activities

1. Student teacher presents the details of the report on teaching strategies that they were assigned in the 1st week. (There are 6 groups per week)
2. Student teachers demonstrate teaching (15-20 minutes)
3. Students have a discussion and each student teacher write questions in their cards.
Three groups have oral presentation and teaching. (5 minutes)

(Break for 10 minutes)

4. Three groups of student teachers (50 minutes) start reporting and demonstrating teaching.
5. Student teachers take their question cards by group questions on Six Thinking Hats
form questions about teaching strategies, trying to relate the questions to six thinking hats. (15 minutes)
6. Conclusion

Resources and materials

1. Reports
2. Cards
3. Paper

Evaluation

1. Reporting
2. Observation group teaching
3. Observation questioning and answering
4. Self evaluation

Assignment

1. Self evaluation the 8th week
2. Assign student teacher to answer questions and write on learning log (the 9th week) as follows :
 - 2.1 What did you find out from Six Thinking Hats?
 - 2.2 How do you apply Six Thinking Hats to teaching?.

Lesson Plan 10

Course 404361 General Methods of Teaching

Date..... Time.....

Aims

1. To provide practice in lessons planning
2. To explore the idea of long-rang plan
3. To promote discussion on learning

Objectives

By the end of the class student teachers will be able to:

1. explain the concept of lessons planning
2. write long-range plan
3. form questions and answer the questions about lesson planning.

Content

- Planning Lessons
 - Types of lesson plan
 - Long-range plan

Learning activities

1. Discuss types of lesson plan
2. Study the sample of long-range plan. Then set up questions and answer questions.
(20 minutes)
3. Students teacher works individually writing long-range plan. (50 minutes)
4. Pair work: Discuss her/his writing long-rang plan. Is there anything new which you have learnt from partner? Write new ideas you have learnt from your discussion in the paper. (20 minutes)
5. Group work: Share their paired writing with all members of a team. Is there anything new you have learnt from the other pairs? Write the new ideas you have learnt from your group discussion in the paper. (20 minutes)

(Break for 10 minutes)

6. Roundrobin activity: Student teachers sit in the cycle. Then each student teacher asks question. The next student teacher answers questions. (30 minutes)
7. Conclusion

Resource and materials

1. Case study (The example of long-range plan)
2. Transparencies

Evaluation

1. Long-range plan
2. Observation
 - set up questions
 - answer questions

Assignment

Student teacher self evaluation

Lesson Plan 11

Course 404361 General Methods of Teaching

Date..... Time.....

Aims

1. To provide practice in planning lessons
2. To explore the idea of daily lesson plan
3. To promote discussion on learning

Objectives

By the end of the class student teachers will be able to:

1. explain the concept of planning lessons
2. write daily lesson plan
3. ask questions about lesson planning and answer the questions

Content

Planning Lessons

- Daily lesson plan

Learning activities

1. Plan music and student teachers write the main idea of song. (10 minutes)
2. Student teacher reads poem and write main idea of poem. (5 minutes)
3. Student teacher reads the text and write main idea of it. (10 minutes)
4. Conclude the issue of writing main idea for teaching strategies and planning for concept teaching. (10 minutes)
5. Have a discussion on planning daily lesson plan. The topics are; selection of content writing objectives, writing learning activities, selection of materials and evaluation. (25 minutes)

(Break for 10 minutes)

6. Divide student teachers in five groups and write daily lesson plan. (40 minutes)
7. Oral presentation. (25 minutes)
8. Draw a conclusion by calling student teachers randomly to answer question.
The lecturer asks the following questions (15 minutes)

1. What is daily lesson plan? (Knowledge)
2. What can happen if the teacher does not set daily lesson plan?
(Comprehension/ Understanding)
3. What would you do if you had to teach and implement a lesson plan that you did not write? (Application)
4. What is the relationship between objectives and evaluation? (Analysis)
5. What would happen if a teacher did not set lesson plan? (Synthesis)
6. What are the advantages of lesson plan. (Evaluation)
9. Wait at least three seconds after asking question to let the student teacher a response

Resources and materials

1. Case study (The example of daily lesson plan)
2. Transparencies

Evaluation

1. Daily lesson plan
2. Observation
 - Set up questions
 - Answer question

Lesson Plan 12

Course 404361 General Methods of Teaching

Date..... Time.....

Aims

1. To explore student and classroom management
2. To consider the role of teacher in creating a positive learning environment
3. To promote discussion on student and classroom management
4. To promote discussion on creating a positive learning environment.

Objectives

By the end of the class student teachers will be able to:

1. ask questions about student and classroom management
2. identify factors that create a positive learning environment

Content

1. Student and classroom management
2. Creating a positive learning environment.

Learning activities

1. Student teachers interview the speakers by focusing questions on classroom management and record the gained information. (The speakers are two fourth year student teachers of the Faculty of Education, Burapha University. They are teaching practicum in school. (30 minutes)
2. Student teachers have a discussion and each student teacher writes retrieval charts. (10 minutes)
3. Divide student teachers into 4 group
4. Each group has a discuss on different topics. The topics are social arrangements (group 1), emotional arrangement (group 2), intellectual arrangement (group 3), and physical arrangement (group 4). (10 minutes)
5. Students from new group. Each new group consists of members from group 1, 2, 3 and 4. (30 minutes)
6. Group oral presentation by using concept mapping. (10 minutes)

(Break for 10 minutes)

7. Hand out an index card to each student. Ask student to write down a question they have about their learning material being studied in the class.
8. Collect the cards, shuffle them, and distribute one to each student. Ask students to read silently the question or topic on their card and think of a response.
9. Invite volunteers to read out loud the card they obtained and give a response
10. After a response is given, ask the others in the class to add to what the volunteers have contributed.
11. Continue as long as there are volunteers. (50 minutes)
12. Conclusion

Resource and materials

1. Paper
2. Crayons
3. Work sheets
4. Index cards

Evaluation

1. Observation
 - set up questions
 - answer questions
 - interview the speakers
 - group work
 - oral presentation

Assignment

- Student teacher self evaluation
- Student teacher sets lesson plan by writing at least 6 questions.

Lesson Plan 13-16

Course 404361 General Methods of Teaching

Date..... Time.....

Aims

1. To promote learner development to their fullest potentials
2. To provide an opportunity for student teacher to demonstrate their teaching
3. To promote learning about the subject through teaching demonstration.

Objectives

By the end of the class student teachers will be able to:

1. describe the process of teaching
2. demonstrate teaching
3. state the strengths and weaknesses of teaching demonstration
4. set up questions
5. answer questions

Content

Demonstration teaching

Learning activities

1. Each student teacher teach as step-by-step according to the lesson plan.
(20 minutes for a person)
2. Student teachers ask questions to evaluate lesson
3. Share questions and answers. (10 minutes)
4. Lecturer summarizes teaching skills and questioning skills.

Remarks

1. There are 5-6 teacher students demonstrating teaching in a week

Resources and materials

1. Lesson plans
2. Name cards

Evaluation

1. Observation
 - teaching
 - questioning / answering
2. Lesson plans

Assignment

1. Student teachers self evaluation on the week 16th
2. The week 16th, conclusion learning course by pair work. Each student teacher draws a right hand of his/her friend. Write a name of a picture and explain meaning. Each finger means as follows:
 - 1) Thumb = Effective
 - 2) Index finger = Constructive
 - 3) Middle finger = Respect
 - 4) Ring finger = Self improvement
 - 5) Pinky = Contribution
3. Lecturer summarizes activity and suggest student teachers student teachers should check their hands and fingers student teachers.

Appendix B

Self-evaluation of Student Teacher

Subject : General Methods of Teaching

Self-evaluation of Student Teacher
Subject 404361 : General Methods of Teaching

Name Date

Direction : Please self-evaluation on learning process.

1. What have you learned from this subject?
.....
.....
.....
.....
2. What were your learning strategies?
.....
.....
.....
.....
3. Were you successful in your learning by using those strategies?
.....
.....
.....
.....
4. What skill do you think you are good at?
.....
.....
.....
.....
5. What do you think you can improve?
.....
.....
.....
.....
6. What else do you need to do to improve yourself?
.....
.....
.....
.....
7. Others/ Comments
.....
.....
.....
.....

Appendix C
The Guiding questions of Group Interview

Group Interview

Facilitating the Questioning Skills of Student Teachers Through Action Research

The group interviews focus on the following guiding questions:

1. How often did you use questions in your class?
2. How did you feel when the lecturer asks questions?
3. How did you feel when you must ask a question?
4. How did you develop appropriate questions?
5. What did you learn from questioning?
6. What problems did you have in class activities?
7. How did you solve the problems?
8. How do you understand your ability for framing questions?
 - Before class activities
 - After class activities
9. What, if anything, have you learned from this work?
10. How did the climate of the university classroom support or hinder your learning?
11. Please provide suggestions.

Appendix D
Lesson Plan “Professional Experience 2”

Faculty of Education Burapha University
Department of Curriculum and Instruction
Subject 404362 : Professional Experience 2
Subject Leader : Roongfa Kitiyanusan

Course Description

Supervised teaching and using instructional materials. Individual and small group teaching and classroom management. Develop lesson plan and implement in classroom. Assist in all teachers duty.

Aims

1. To develop lesson plans and practise in teaching.
2. To observe educational systems in schools.
3. To observe activities and methods of instruction in various subjects in the classroom
4. To learn and experience the duties of the teacher
5. To promote positive attitude toward the teacher profession
6. To readiness of pre-service teachers.

Activities

1. Lecture
2. Discussion
3. Video of model of teaching
4. Observation in school
5. Develop lesson plan
6. Practice teaching

Assignment

Individual work	30%
• A learning log	10%
• A lesson plan	10%

• Teaching demonstration	10%
Group work	20%
• Report and presentation	10%
• Group teaching	10%
Final examination	50%

Recommended Reading:

Eggen, P.D. & Kauchak, D.P. 1996, *Strategies for Teachers: Teaching Content and Thinking Skills*, 3rd edn, A Simon & Schuster Company, U.S.A.

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Joyce, B., Weil, M. & Calholin, E. 2000, *Models of Teaching*, 6th edn, A Pearson Education Company, Needham Heights, MA.

Khemmani, T, 2000, *Fourteen Teaching Methods for Professional Teachers*, Chulalongkhorn University, Bangkok.

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Lang, H.R., McBeath, A. & Hebert, J. 1995, *Teaching Strategies and Methods for Student-Centered Instruction*, Harcourt Brace & Company, U.S.A.

Moore, K.D. 1998, *Classroom Teaching Skills*, 4th edn, The Clarinda Company, Baskerville.

Office of the National Education Commission, 2000, *Learning Reform: A Learner – Centred Approach*, Watana Panit Printing & Publishing Company Limited, Bangkok.

Office of the National Education Commission, 2000, *National Education Act B.E. 2542 (1999)*, Pring Wan Graphic Co., Ltd., Bangkok, Thailand.

Srisaard, B, 1992, *The Development of Teaching*, Suviriyasarn, Bangkok

Lesson Plan 1

Course 404362: Professional Experience 2

DateTime

Aims:

1. To clarify the course
2. To clarify the assignment and how it might be undertaken.

Objective:

By the end of the class, student teachers will be able to:

1. explain the details of course by questioning and answering.
2. analyse the course

Content

Course Syllabus 404362

Learning activities

1. Each student teacher sets a question that introduces her/him self or anything he/she would like share with the class. (10 minutes)
2. To share questioning and answering. (20 minutes)
3. Orientate the course, activities and assignments by allocating student teachers to read the course syllabus 404362. (30 minutes)
4. Each student teacher asked questions and lecturer answer questions. (20 minutes)

(Break for 10 minutes)

5. Each student teacher write questions about the course. (10 minutes)
6. Student teachers work in pair discussing and concluding the course. Then the pairs create some new questions on cards. (20 minutes)
7. Ask student teacher to volunteer to present questions and answers. Conclusion and collect cards (20 minutes)
8. Student teachers write the plan of learning in the course which could lead them to the set goals (10 minutes)

Resources and materials

1. Course Syllabus 404362
2. Cards

Evaluation

- Observation
 - Set up questions
 - Answer questions

Assignment

- Student teachers form group of three prepare for presentation on the next week
- Each student teacher sets a question in his/her learning log.

Lesson Plan 2

Course 404362 : Professional Experience 2

DateTime

Aims

1. To enable the student teachers to understand teaching in primary school and secondary school.
2. To develop a sense of questioning

Objective

By the end of the class student teachers will be able to:

1. explain the good model of teaching of model teacher in primary and secondary school.
2. set up questions on learning topic.

Content

Teaching and learning in primary and secondary school

Learning activities

1. The student teachers (7 groups) present the detail of the good model of teaching of model teacher in primary and secondary school.
2. The model of presentation is interviewing. Some student teachers act as interviewers and interviewees by focusing on their report topics.(Each group has 15 minutes)
3. Student teachers in classroom record the gained information and prepare questions to ask the speakers by writing on cards.
4. Questioning and answering (Each group has 5 minutes)

(Break time after the forth group finish, 10 minutes)

5. Lecturer randomly to asking questions in each group
6. Conclusion, collect cards and classify questions by the types of questions (Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation)

Resources and materials

1. Reports of student teachers
2. Cards
3. Name cards

Evaluation

1. Observation
 - presentation
 - interviewing
 - questioning
 - answering
2. Reports

Assignment

Each student teacher sets a question in his/her learning log.

Lesson Plan 3

Course 404362: Professional Experience 2

DateTime

Aims

1. To consider teaching skills
2. To promote learning about teaching skills

Objective

By the end of the class student teachers will be able to:

1. discuss good and bad teaching skills
2. analyse the quality of teaching
3. question about Six Thinking Hats on learning topic

Content

Teaching skills

Learning activities

1. Watch video of teaching which is of two student teachers studied General Methods of Teaching. They are volunteers to reflect their demonstration teaching (50 minutes)
2. Student teacher sets 10 questions on teaching skills by using Six Thinking Hats. (20 minutes).

(Break for 10 minutes)

3. Discuss teaching and focus on teaching skill especially questioning skill. Then discuss on good classroom questions (30 minutes)
4. Share questions in a group. (A group has 3 student teachers). Analyse what the high level questions are. Write on the paper (20 minutes)
5. Each group presents questions (20 minutes)
6. Conclusion questions and teaching skill (10 minutes)

Resources and materials

1. Video
2. Colour cards
3. Cards
4. Crayons

Evaluation

1. Observation
 - discussion
 - set up questions

Assignment

- Each student teacher sets up a question in his/her learning log.
- Bring learning logs to class in the next week for sharing and partner feedback

Lesson Plan 4

Course 404362: Professional Experience 2

DateTime

Aims

To review writing daily lesson plan

1. To provide practice in planning lessons
2. To explore the idea of daily lesson plan.

Objectives

By the end of the class student teachers will be able to:

1. write daily lesson plan
2. use questions

Content

Planning the lessons

- Daily lesson plan

Learning activities

1. Review writing daily lesson plan by randomly drawn name cards of student teachers to answer questions. These are example of questions. (30 minutes)
 - What is the difference between Long-rang plan and daily lesson plan?
 - What is daily lesson plan?
 - What is the relationship between objective and activities?
 - What learning strategies do you plan in classroom?
 - How do you know the student understand learning process?
 - How do you feel about writing lesson plan?
 - How do you write the good lesson plan?
 - What are the advantages of lesson plan?
2. Discussion of lesson plan writing.
3. Divide student teachers in five groups write daily lesson plan by working on work sheet. Student teachers set lesson plan by writing at least 6 questions (40 minutes).

(Break for 10 minutes)

4. Oral presentation (30 minutes)
5. Each student teacher writes questions on cards as he/she is a teacher and must ask good questions (20 minutes)
6. Presentation and conclusion. (15 minutes)
7. Sharing and giving feedback of learning log. Student teachers work in pair. (5 minutes)

Resources and materials

1. Questions
2. Transparencies
3. Paper
4. Crayons
5. Work sheet
6. Name cards
7. Cards

Evaluation

1. Observation
 - Set up questions
 - Answer questions
2. Checking lesson plan

Assignment

- Student teacher self- evaluation
- Each student teacher sets up a question in his/her learning log
- Student teacher sets lesson plan by writing at least 6 questions.

Lesson Plan 5-7

Course 404362: Professional Experience 2

DateTime

Aims

1. To promote student teachers development to their fullest potentials
2. To provide an opportunity for student teacher to demonstrate their teaching
3. To promote learning about the subject through teaching demonstration

Objective

By the end of the class student teachers will be able to:

1. demonstrate teaching
2. states the strengths and weaknesses of teaching demonstration
3. set up questions
4. answer questions

Content

Practice teaching

Learning activities

1. Each student teacher teach as step-by-step according to the lesson plan (20 minutes for a person)
2. Student teachers positive support comment and analyse the strengths and weakness of teaching demonstration
3. Summarizes teaching skills and questioning skills.

Remarks

- There are 7 student teachers demonstrating teaching in a week.

Resource and materials

Lesson plans

Evaluation

1. Observation
 - teaching
 - questioning / answering
2. Lesson plans

Assignment

- Student teachers self evaluation on the week 7th
- Each student teacher sets up a question in his/her learning log on the week 5th, 6th, 7th.

Lesson Plan 8-9

Course 404362: Professional Experience 2

DateTime

Aims

1. To provide an opportunities for student teachers to work in school
2. To promote learning about teacher profession
3. To prepare student teachers for the teaching profession.

Objective

By the end of the class student teachers will be able to:

1. explain working of teacher in school
2. discuss teaching and learning in school
3. analyse the teachers' works in the school

Content

Practical experiences in teaching profession.

Learning activities

1. Divide student teachers in to 5 group. Each group has 4-5 members.
2. Each group observes teaching and learning in the classroom, and work in the classroom. They must help teacher in classroom management, checking exercises of students, make some teaching materials etc. (150 minutes).

Resources and materials

- School / classroom

Evaluation

1. Observation
 - responsibility
 - personality
 - performance

2. Informal interview student teachers and teacher

Assignment

- Student teachers reflect learning in the classroom in the learning log
- Student teacher must informal interview a student in the classroom. He/ She sets up questions by focus/on teaching and learning in school. Then give more details on questioning in the learning log.
- Bring learning logs to class in the week 10th and student teachers work in pair, sharing and giving feedback of their learning log.

Lesson Plan 10

Course 404362: Professional Experience 2

DateTime

Aims

1. To reflect learning in the classroom
2. To analyse the works of teacher
3. To evaluate student teachers performance in the classroom

Objective

By the end of the class student teachers will be able to:

1. answer and ask questions on teaching and learning in the classroom
2. discuss the works of student teachers
3. collaborate lesson planning

Content

Practical experience in school

Learning activities

1. Sharing and giving feedback on learning log. (10 minutes)
2. Each student teacher write a card what he/she has learned from school.
(20 minutes)
3. Send his/her card to the next person.
4. Read the details and set questions. (20 minutes)

(Break for 10 minutes)

5. Divide student teachers in to 5 groups. Each group makes concept mapping from the details of cards which are answers and questions (40 minutes)
6. Present the concept mapping to class. (20 minutes)
7. Discussion by questioning and answering. (10 minutes)
8. Student teacher chooses their partner for team teaching in school next week.
Collaborate on planning lesson. (20 minutes).

Resources and materials

1. Learning logs
2. Cards
3. Paper
4. Crayons

Evaluation

1. Observation
 - questioning
 - answering
 - discussion
 - group work
 - presentation

Assignment

- Student teacher self evaluation
- Student teacher develop lesson plan by writing at least 6 questions.

Lesson Plan 11-14

Course 404362: Professional Experience 2

DateTime

Aims

1. To encourage learning teaching in school
2. To provide an opportunity for student teachers to team teaching
3. To involve student teachers in teaching skills

Objective

By the end of the class student teachers will be able to:

1. describe the process of teaching
2. develop the lesson plan
3. plan the practical experiences in school
4. practice teaching skills

Content

Practical experience in teaching.

Learning activities

1. Student teachers work in pair, develop lesson plan. They will plan on team teaching. Their lesson plan need to have at least 6 questions, and each student teacher should ask at least 3 questions in his/her teaching.
2. Each group takes turn to observe the team teaching by focusing on questioning skills and giving positive feedback and comment.
3. Lecturer observes student teachers by focusing questioning skills and supportive feedback and comment.

Remarks

1. Student teacher practice teaching in school about 3 hours (180 minutes) in a week.
2. Student teachers appoint date/time for their teaching. Lecturer observes teaching in the classroom for three groups (6 student teachers) in a week.

Resources and materials

1. Lesson plans
2. Observation form
3. School / students

Evaluation

1. Observation
 - Teaching skill
 - Questioning skill
2. Checking lesson plans

Assignment

- Student teacher self evaluation
- Bring learning logs to class in the next session for sharing and feedback

Lesson Plan 15

Course 404362: Professional Experience 2

DateTime

Aims

1. To reflect teaching and learning in the school
2. To analyse student teachers in teaching practicum
3. To evaluate teaching practicum
4. To share learning experiences.

Objective

By the end of the class student teachers will be able to :

1. Answer and ask questions on teaching and learning in the classroom
2. report what student teacher has learned
3. discuss teaching and learning in the classroom.
4. analyse teaching skills by focus on questioning skill

Content

Reflection of teaching and learning in the school.

Learning activities

1. Sharing and giving feedback on learning log (10 minutes)
2. Roundrobin activity : Student teachers sit in the cycle. Then each student teacher ask question. The next student teacher answers question. The questions focus on teaching and learning in the school (30 minutes)
3. Discussion and conclusion teaching and learning in school by lecturer asks some questions. (10 minutes)
4. Student teacher reviews his/her questions which was used in the classroom.
(Week 11th -14th) Then rethink and rewrite new questions on card. (10 minutes)
5. Student teachers volunteer to read their questions. (20 minutes)

(Break for 10 minutes)

6. Divide the student teachers into groups of four members.
7. Each group discuss on. What/how is good question?
8. Make the mind map, draw pictures and present it to class. (50 minutes)
9. Conclusion on good questions and questioning skills (10 minutes)
10. Discussion on teacher effectiveness

Resources and materials

1. Learning log
2. Cards
3. Paper
4. Crayons
5. Transparencies

Evaluation

1. Observation
 - discussion
 - set up questions
 - group work
 - presentation

Assignment

- Student teacher answers questions on learning log. They are as follows:
 - What have you learned in the subject?
 - How do feel about teaching profession?

Appendix E
Self-evaluation of Student Teacher
Subject : Professional Experience 2

Self-evaluation of Student Teacher
Subject 404362 : Professional Experience 2

Name Date

Direction : Please self-evaluation on learning process.

1. What have you learned from this subject?

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.....

2. What were your learning strategies?

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3. Were you successful in your learning by using those strategies?

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4. What skill do you think you are good at?

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5. What do you think you can improve?

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6. What else do you need to do to improve yourself?

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.....
.....

7. Others

.....
.....
.....
.....

Appendix F
Context for Learning

Context for learning

The research project: The Facilitating Questioning Skills of Student Teachers Through Action Research

Student teachers: Student teachers of the Faculty of Education, Burapha University, Thailand

Course: 404361 General Methods of Teaching,
Course: 404362 Professional Experience 2

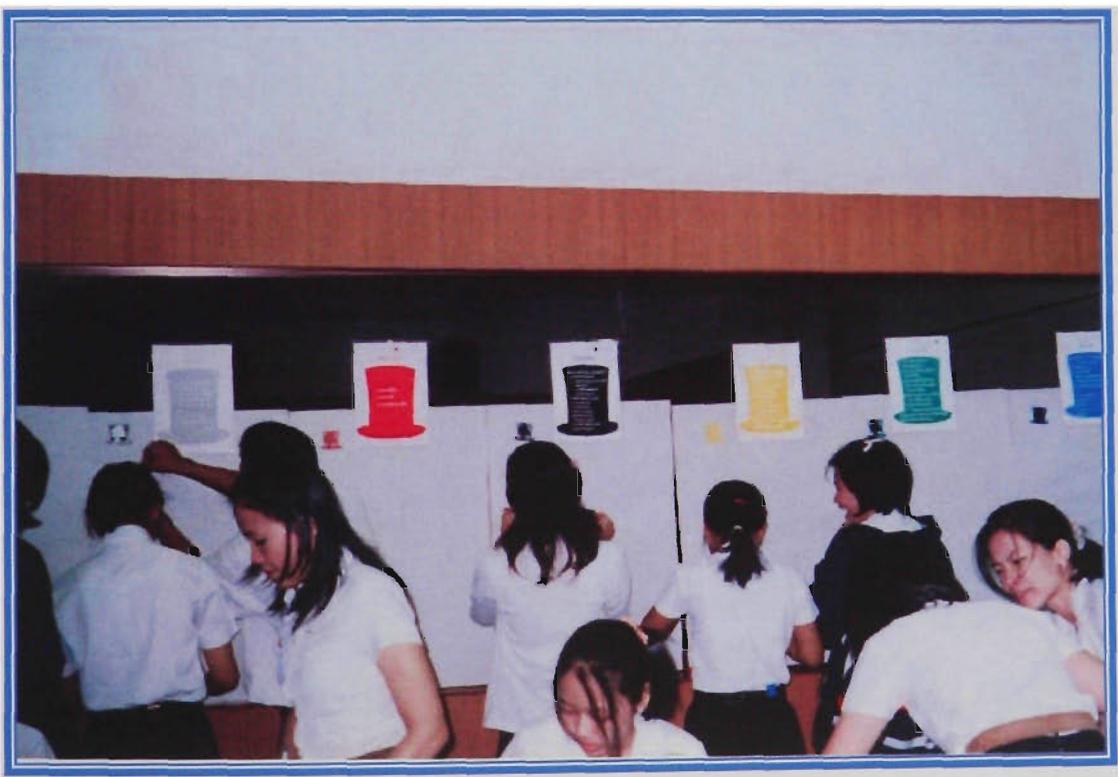
<i>Details</i>	<i>General Methods of Teaching</i>	<i>Professional Experience 2</i>
Time of course	16 weeks (a semester)	16 weeks (a semester)
Time of week	3 hours per week	3 hours per week
Number of student teachers enrolled	21 (Major biology)	21 (Major biology)
Male	2	1
Female	19	20
Age	20-21	20-21
Social background They come from:		
• East of Thailand	21 student teachers	21 student teachers
Family (Parents' occupation)		
• Government official	7	7
• Business (own business)	2	3
• Farmer	6	5
• Worker	6	6

The details of participants

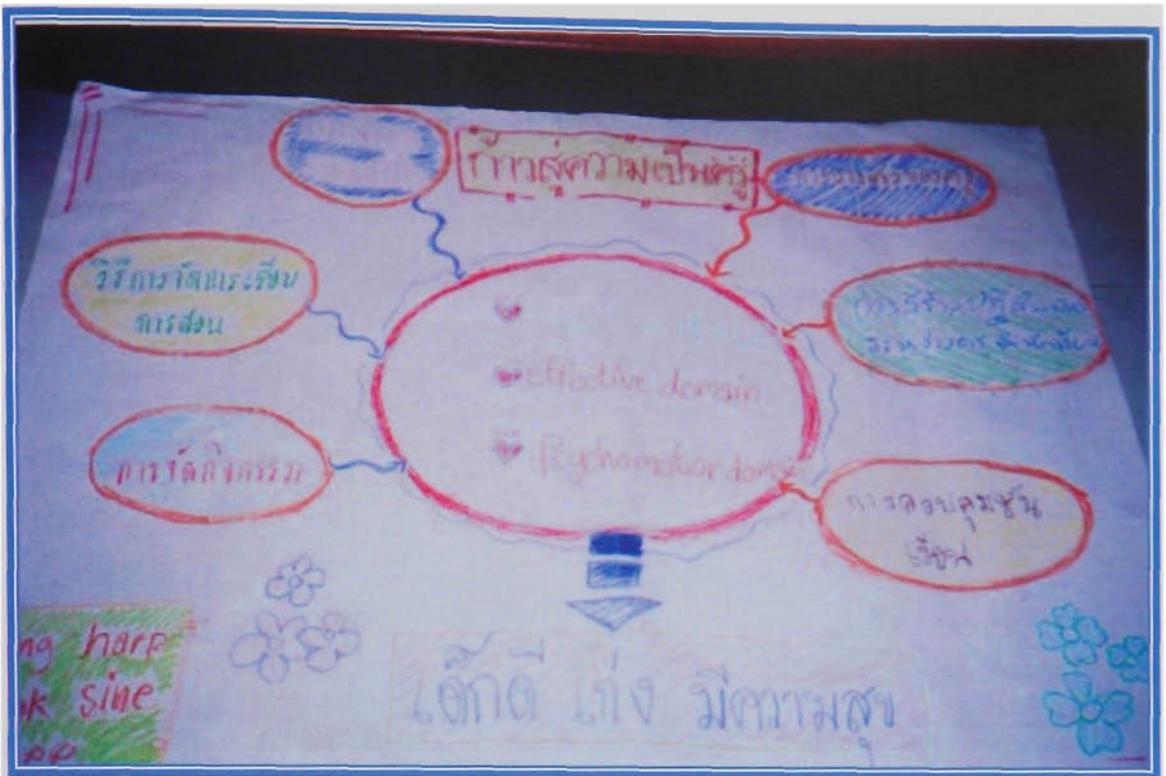
The research project: The Facilitating Questioning Skills of Student Teachers Through Action Research

<i>Details</i>	<i>General Methods of Teaching</i>	<i>Professional Experience 2</i>
Number of student teachers	10 (Male=2, Female = 8)	Female 5
Social background They come from:		
• East of Thailand	10	5
Family (Parents' occupation)		
• Government official	3	1
• Farmer	3	2
• Worker	4	2
Other information		
• Secondary School		
- Government School	9	4
- Demonstration School	1	1
• Attitude to be teacher		
- positive	9	5
- none	1	-

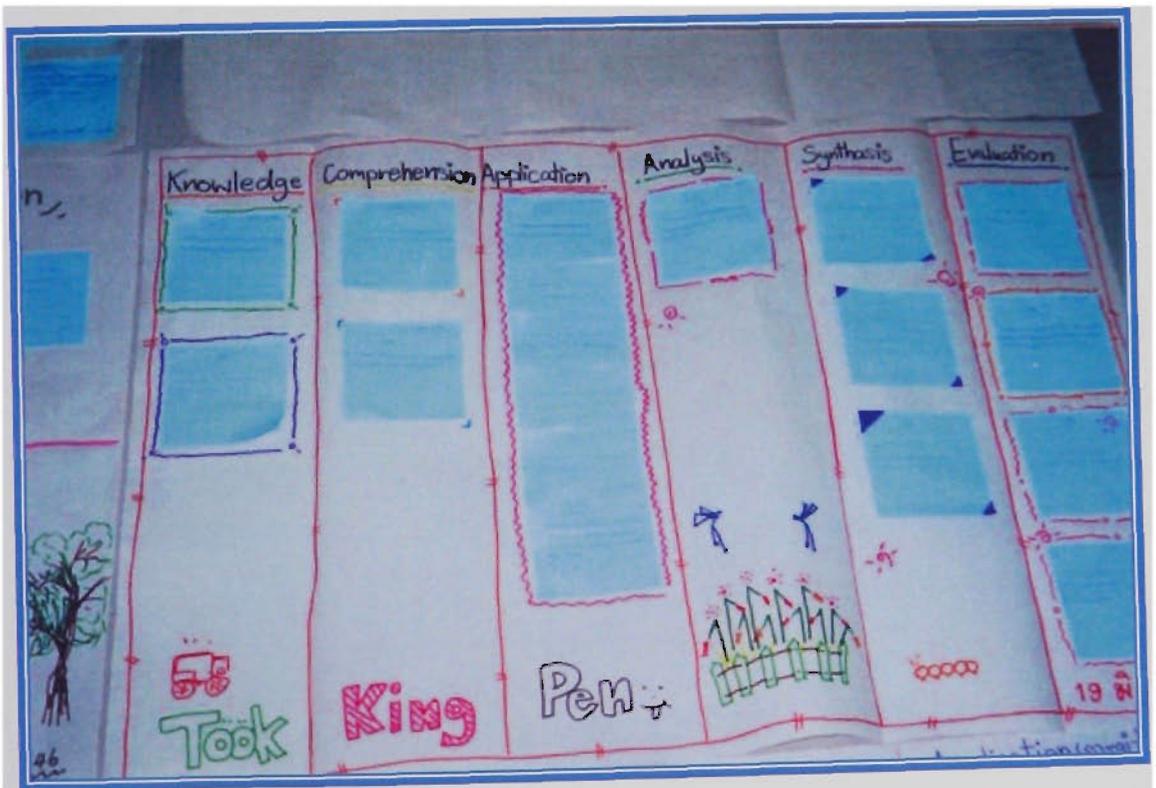
Appendix G
Some Photographs (Class Activities)



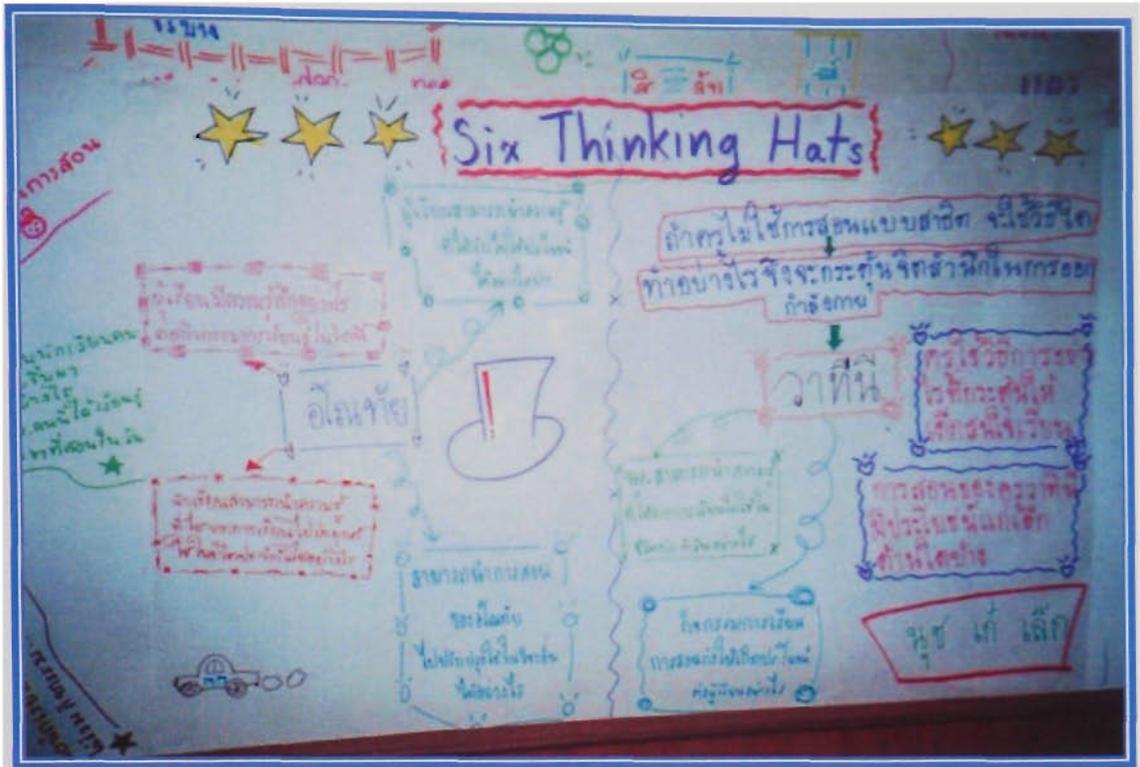
Six Thinking Hats



Concept mapping / Oral presentation



Student teachers set and classify questions by the types of questions.



Student teachers shared Six Thinking Hats and analyzed the high level questions.



Student teachers practiced teaching in university classroom.



Student teachers practiced teaching in school classroom.

Appendix H
Glossary

Glossary

The lecturer means the Faculty staff member who personal with major responsibilities for teaching and research in the state and private educational institutions at the degree level.

The student teacher means a student who studies in the Faculty of Education.

The school teacher means professional personal with major responsibilities for learning and teaching and encouragement of learning among learners through various methods in both state and private educational institutions.

The school student means a student who studies in the school.

The university classroom means the classroom in the Faculty of Education.

The school classroom means the classroom in the school.