OPEN-ENDED APPROACH AND TEACHER EDUCATION

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During 1970s and 1980s, open-ended approach had emerged as a method to reform mathematics teaching of Japanese classrooms and has been spreading around the world. In the 1990s lesson study, a Japanese style of professional development, become known to other countries. During this time educational reform movement in Thailand has been focusing on reforming of student' learning processes and calling for innovative teacher education program. This paper describes how in this era open-ended approach when being integrated with lesson study has become an innovative mathematics teaching to improve teacher education in Thailand.

A BRIEF ON TEACHER EDUCATION

Teacher education or the education of teacher has a long history. In various parts of the world, as Gibb et al. (2003) mentioned, the need for better-qualified teachers has been a critical issue in the minds of parents and educators. In what follows, many classic questions in this field are still debatable issues to the present time: What are the essential characteristics of a professional program for teachers? Should a program for teachers differ from a liberal arts program, and if so, what should be the distinctive features of the treatment of subject matter in each type of program?, and what types of courses in professional education should be required of prospective teachers? (Gibb et al., 2003). This paper emphasizes the last question while concerned with other questions.

Much of the research supports the idea that teacher preparation is important, and that knowledge and skill is built over time, in a coherent program of study. Here are some suggestions from National Council for Accreditation of Teacher Education: High quality educator preparation makes a difference in student learning, teacher preparation increases teacher retention, and teacher preparation helps candidates acquire essential knowledge and skills.

Thailand has undergone many problems in establishing programs for teacher education, particularly in science and mathematics teacher education. Not until the last decade, 36 teachers' colleges and 8 universities of education locating across the country had gained high respectability in providing teachers to elementary and secondary schools. The persons who entered teachers' college and university of education at that time were high-achiever students from various schools. However, after universities of education had been changed to be comprehensive universities thirty years ago and teachers' colleges had been changed to be Rajabaht Institute 10 year ago and now become Rajabaht universities, faculties of education at these

universities have become ′second-class′ faculties in terms of their profile. The graduates feel inferior to graduates from other programs and often have negative attitudes towards their career. This is a crucial problem for most teacher education programs currently.

After the 1999 Educational Acts was enacted, Thailand was put into an educational reform movement. Most school teachers have been attempting to improve their teaching practice. Unfortunately, they lack any innovation to improve their everyday work. Most teachers still use a traditional teaching style focusing on coverage of contents, but they neglect to emphasize students' learning processes and their attitudes toward learning with understanding. More importantly, a number of teachers classify themselves into a reforming group (e.g., master teachers, initiative teachers etc.,) but in effect do not realize that they are still in an old paradigm.

Regarding this point, there are many crucial aspects of the educational reform movement in many countries. Among other things, teacher training is a central issue. Teachers need to learn how to capture students` learning processes and to examine their own practice, etc. However, we lack clarity about how to best design initiatives that involve the examination of practice (Ball, 1996; Lampert, 1999; Shulman, 1992; cf., Fernandez et al., 2003)

Among other alternatives, lesson study is a comprehensive and well-articulated process for examining practice that many Japanese teachers are engaging in (Fernandez, Cannon & Chokshi, 2003). In fact, recently a number of American researchers and educators have suggested that lesson study might be an incredibly beneficial approach to examining practice for US teachers (Lewis&Tsuchida, 1997; Stigler&Hiebert, 1999; Yoshida, 1999; cf., Fernandez et al., 2003).

However, the most difficult part of implementing lesson study in a new classroom culture is that how to get started. Teachers who are new to this approach always insist asking where the first lesson comes from, and how to know that is a study lesson worth for continuing study. To shift from making lesson plan according to the topics ascribed in the curriculum to making lesson plans that will satisfy the long goal as expected in lesson study is not an easy work. It demands changing of teachers' beliefs while challenging them to encounter a new paradigm of teaching mathematics. To solve this problem, using open-ended approach in order to create ***a rich mathematical activity*** is the most important part of making the first study lesson.

A BRIEF ON OPEN-ENDED APPROACH

Open-ended approach originated in Japan during 1970s. Between 1971 and 1976, Japanese researchers carried out a series of developmental research projects on methods of evaluating higher-order-thinking skills in mathematics education using open-ended problems as a theme (Becker and Shigeru, 1997). This approach started with having students engaging in open-ended problems which are formulated to have multiple correct answers "incomplete" or "open-ended". In terms of teaching method,

one “open-ended” problem is posed to the students first, then, proceeds by using many correct answer to the given problem to provide experience in finding something new during the problem-solving process. Mathematical activities generated by open-ended problems are very rich and subtle so as teachers can evaluate student’s higher-order-thinking skills. In a sense, open-ended problem is a good start for creating the first study lesson for the purpose of study in lesson study approach.

Constructing a good open-ended problem is not an easy task. Suggestions for constructing appeared on *The Open-ended Approach: A New Proposal for Teaching Mathematics* may help doing that. However, for the new comers those suggestions are still very difficult.

Japanese teachers have long experiences in developing story problems. Thus, they can implement the suggestions just mentioned in order to make their own open-ended problems. However, for Thai teachers they are familiar with introducing new contents to students through some examples and exercises. It is very difficult for them to organize many mathematical concepts into a problem situation, which is an important part of open-ended problems. This kind of problem situation has to be formulated so that mathematical activity can be naturally generated from it. In what follow, the project introduces the concept of presenting the problem situation in terms of some 3-5 short instructions instead of presenting in terms of story.

In this way, it is easy for students to start mathematical activity from the given open-ended problems. It is also so suitable for teachers to investigate how their formulated open-ended problems have been engaged in by the students. This will be helpful for them to revise their open-ended problems which included in lesson plan. This will be a good start of lesson study.

AN EXEMPLAR OF NTEGRATING OPEN-ENDED APPROACH AND LESSON STUDY

To illustrate how to implement the idea mentioned above into teaching practice, the author conducted a small project with 15 student teachers enrolled in the practicum teaching course. This attempt is an expansion of the meanings of professional development and also the notion of lesson study. Similar to professional development of school teachers, student teachers need to examine their own practice. In the 2002 academic year, the Faculty of Education at Khon Kaen University, in an attempt to improve teacher education program, conducted a project to investigate how student teachers develop their worldview on teaching practice and to investigate how school students in the classrooms using the Open-Approach method of teaching recognize their learning experiences.

Overview

The project was conducted in the 2002 academic year in 7 schools in Khon Kaen province in the northeastern part of Thailand. It is aimed at investigating changes in student teachers' worldview on their professional development when using the Open-Approach method of teaching (Nohda, 2000). The project is also aimed at clarifying how school students recognize their learning experiences. Fifteen student teachers voluntarily participated in this project and 1200 junior highschool students responded to the survey. Those student teachers enrolled in the forth year of the bachelor degree program at the Faculty of Education, Khon Kaen university. According to the requirement of the program, they had to conduct their practicum teaching at their selected schools for one semester (about four months and a half). They had to follow some regular activities designed by the program and had to follow some additional required activities designed by the research project. In what follows, regular activities and required activities for this project are described.

1) The Research Project Settings

1.1 Regular activities requiring all student teachers to do

All student teachers had to teach in Khon Kaen urban area 6-8 periods (about 50 minutes for one period) a week. The school teachers who serve as school supervisors can assign appropriate work to the student teachers. For one semester, the student teachers were supervised 4 times by school supervisors and another one time by supervisors from the faculty. They also had to conduct a classroom research under advisorship of his/her research advisor. Furthermore, they had to attend seminar or to meet their research advisors on every Friday afternoon (approximately three hours).

1.2 Required activities for the research project

Fifteen student teachers who participated in the research project had attended a one-month workshop for constructing lesson plans to be used later in the first semester of 2002 academic year. They were grouped according to school levels they intended to teach. Six were in the 7th-grade group. Five were in the 8th-grade group and four in the 9th-grade group. Coached by the researcher, they spent about 6 hours a day constructing lesson plans using open-ended problems. Ten units of lesson plans to be used for 10 weeks were completed before they went to schools. The remaining 5 units were conducted afterward.

In order to have a chance to share their experiences of teaching by the open-approach method, the 15 student teachers attended a special seminar organized by the researcher on every Friday. In this seminar they expressed their common concerns, interesting points, changes of some particular students' behaviors, and etc. Furthermore, they were expected to develop some ideas in order to conduct classroom research.

During the whole semester, they also had to make a journal related to their experiences of teaching with the open-approach method. This journal was used for discussion in the special seminar on Friday.

1.3 Parts of the Research Results

In response to the aims of the research project, research results will be described in two categories: Change in student teachers' worldview on teaching practice and learning experiences of students in the classrooms using the open-approach method of teaching.

1.3.1 Change in student teachers' worldview on teaching practice

During the first half of the semester all student teachers in the project experienced the difficulty in adjusting to their roles in classroom organization. Participating in Friday seminar made most of the student teachers gradually change their worldviews on teachers' role. The most critical point of change depended upon encountering different experiences of their friends. Sharing experiences with their friends in Friday seminar not only resolved their common concerns but also developed their worldview on teaching practice which in turn reflecting their worldview on professional development. The most important aspect of student teachers' worldview is that teaching mathematics does not mean only focusing on the coverage of content. Emphasizing on students' learning processes, original ideas and also attitudes towards learning mathematics satisfying one's competence is more importantly.

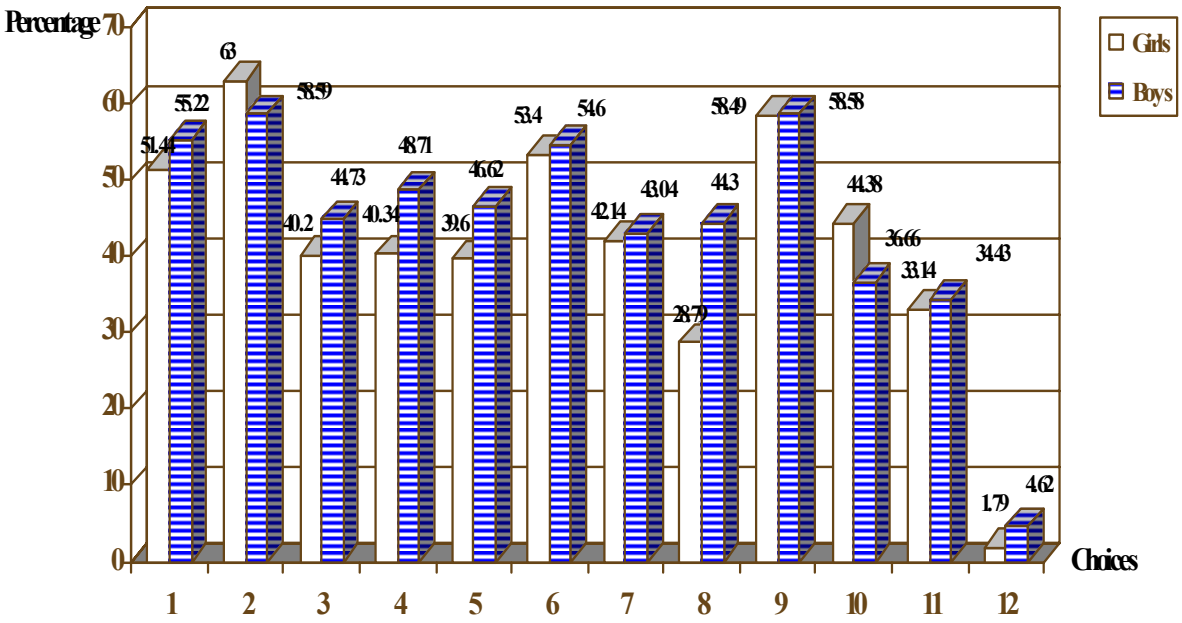
Most of the student teachers developed positive attitudes towards doing research during teaching practice. They have come to realize that doing classroom research can help them develop a wider perspective on how to view their classrooms. Moreover, they acknowledged that classroom research may help improve teachers' everyday practice.

Most importantly, student teachers in the project changed their attitudes towards learning from academic learning to life-long learning. Their paradigm on teaching and learning has been shifted into a new one which is seen a unification of their way of life and their learning. This also influences their educational values on their own contribution to society, the core values demanding for Thai society.

1.3.2 School students' recognition of learning experiences in the classrooms using Open-Approach method of teaching

In what follows, some of school students' learning experiences are illustrated according to items in the survey of about 1200 secondary school students in the above-mentioned 7 schools who experienced the open-approach method of teaching.

Figure 1 showing the responses to the item "Give the reasons why do you like doing activity in the classrooms?" (Select from the given choices)

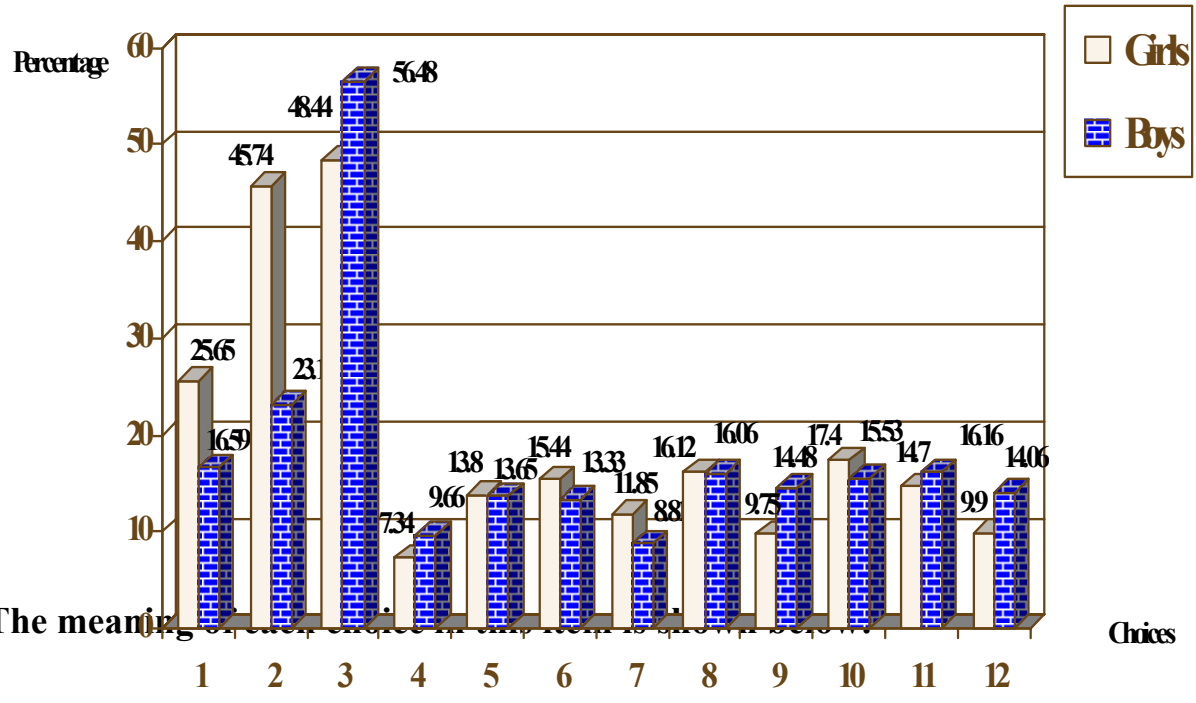


The meaning of each choice in this item is shown below:

1: More Active 2: More Thinking 3: More Playing 4: Use Art knowledge

5: Good atmosphere, friendship 6: Do something originally 7: Feel like independent time 8: Feel like be more valuable 9: Do real practice with given materials 10: Summarize some ideas by themselves (or by own group) 11: When think out, feel like "genius" 12: Feel not be boring.

Figure 2 showing the responses to the item "Give the reasons why you do not like doing activity in the classrooms?" (Select from the given choices)

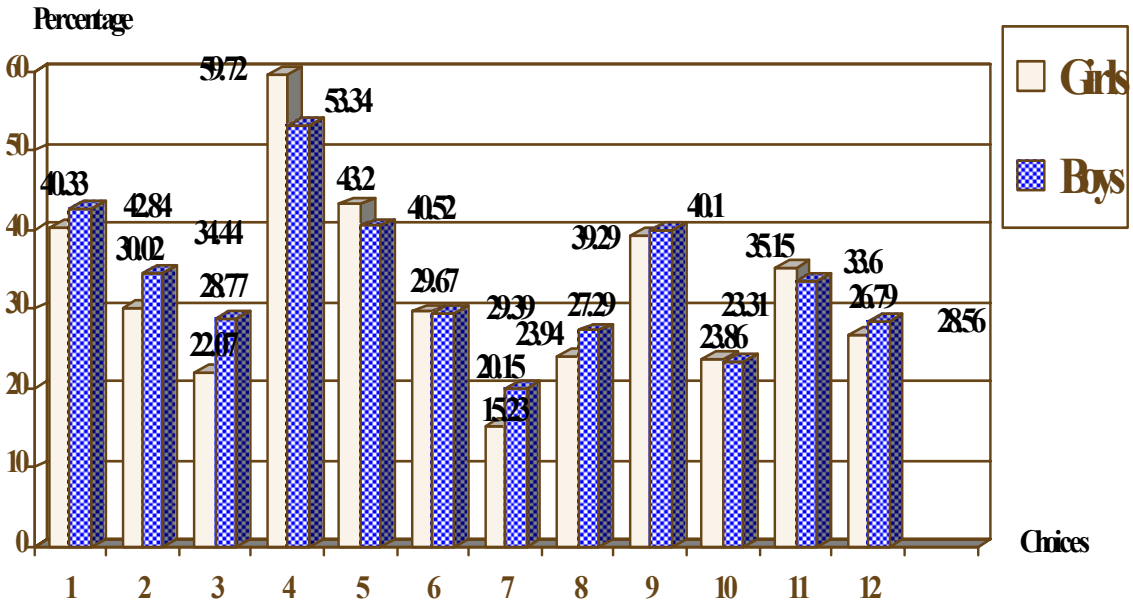


The meaning of each choice in this item is shown below:

1: Boring 2: Quite not understand questions or direction clearly 3: Feel that loudly Classrooms 4: Do not like working in group 5: Do not like someone in own group 6: Quite difficult activity 7: Do not know "to do for what" 8: Cannot conclude or connect ideas in activities 9: Feel that do not learn the same things as friends do in other classes 10: Do not know what to do to answer "the why how questions" 11: Teachers cannot observe all students 12: Time restricted.

Figure 1 and 2 shows a very high consistency that most of the school students like doing activity in the classrooms using Open-Approach method of teaching. The percentage of 2nd choice in figure 1 proved evidence that this kind of classroom activity enhancing the students to think than they used to be.

Figure 3 showing the responses to the item "Explain in what issues you change in positive way?" (Select from the given choices)

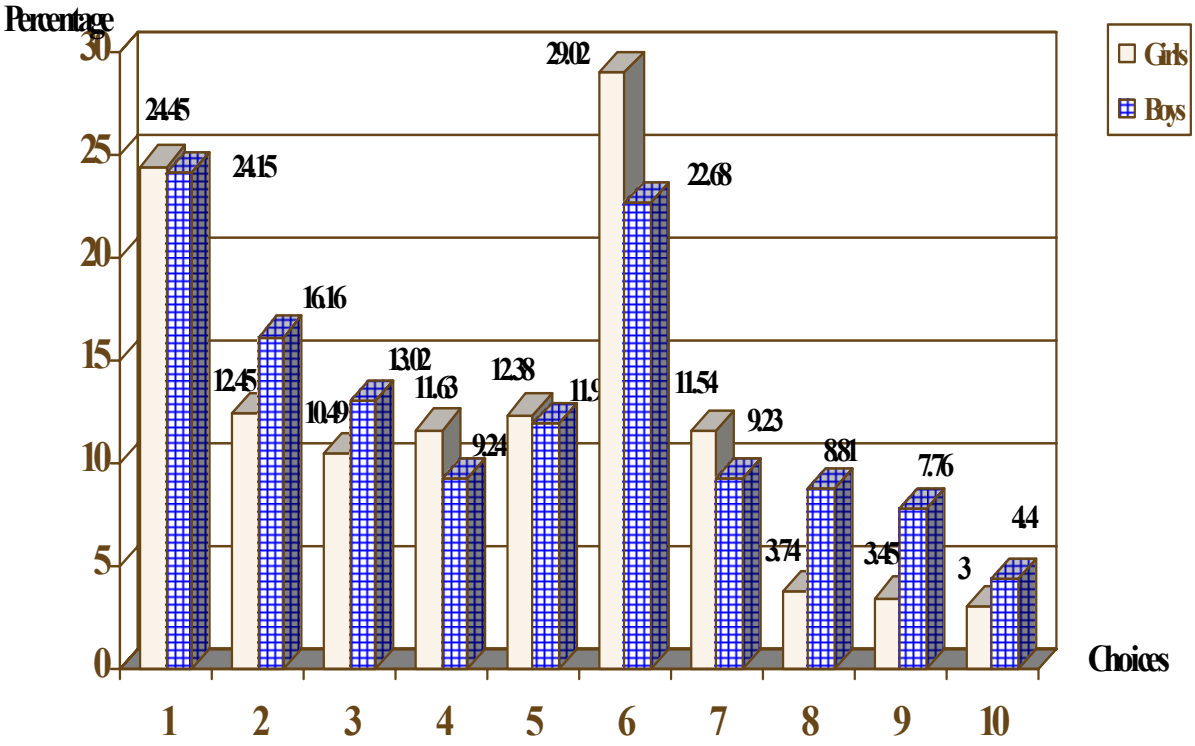


The meaning of each choice in this item is shown below:

1: More reasonable 2: More skillful in observation 3: More cooled-heart

4: Know how to work cooperatively 5: Dare to ask question 6: Dare to argue according to their own thinking 7: Dare to reject what they do not accept 8: Better communication with friends 9: Know how to solve problems in a variety of ways 10: More connected knowledge networking 11: More enthusiasm 12: Better achievement.

Figure 4 showing the responses to the item "Explain in what issues you change in negative way?" (Select from the given choices)



The meaning of each item is shown below:

1: Do not use the fullest ability or capacity 2: Lose confidence because of rejection of group 3: Friends or teacher dominate ideas 4: Inert 5: Being bored with maths than before 6: Tension and anxiety 7: Worse achievement 8: Quite show off 9: Feel not belong to group 10: Others (not friendship)

The responses to the items 3-4 mentioned above shows in what way the school students recognize their learning experiences. Choice 4 in figure 3 is the most interesting one. Nearly 60 percents of the school students learned how to work cooperatively. This situation sharply contrasts with the traditional classrooms in Thailand which mainly focusing on individual seat working.

From choice 9 in figure 4, since there is nearly 30 percents of the students who feel anxious, it is worthwhile to be concerned with this issue if we plan to expand the implementation of open-approach and lesson study in the future.

CONCLUSION

The project provides many ideas on professional development. The line between programs for student teachers and in-service teachers is blurred. It is worthwhile to conceive that programs for professional development should start in earlier years of teacher education programs. So far, lesson study approach started to have a great

influence on the reform of program for professional development in Thailand. The National Commission on Science and Mathematics Education incorporates the concept of lesson study into the framework on the development of science and mathematics education. The Faculty of Education at Khon Kaen University started implementing lesson study approach into a new 5-year program in the 2004 academic year. In the proposal submitted to the ministry of education, Thailand to establish Center of Excellence in Mathematics the concept of integrating open-ended approach and lesson study approach is put into the framework of professional development.

Khon Kaen University has also just started a training program for mathematics and science teachers from Lao PDR since 2002. This training program also implements the integrated open-approach teaching method and lesson study approach. This kind of professional development may create teacher networking among countries in the Great Mekhong Sub-region in the near future.

References

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