Lesson Study: Innovation for Improving Teachers and Students in Thailand

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What to keep in mind?

Teaching is a cultural activity.
(Stigler & Hiebert, 1999)

and is embedded in
sophisticated classroom culture
Briefly introduce the background of the reflective practices
Teaching Profession
(Classroom Teaching Practices)

System of Development of Teaching Profession

Improvement of Teaching Profession
(How to improve it in closely relation to teaching profession)
Traditional teaching Approach

transmit

demonstrating, questioning, describing, lecturing, etc.,

memorizing

A teacher

Contents

z...Z...Z

Students

Inprasitha, 2011

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Teaching Profession
(Focusing on contents)

System of Development of Teaching Profession

Improvement of Teaching Profession
(Training for improve contents)
How to improve “teaching profession”?

• Short-course training focusing on “content” based training

• No legal regulations for long-term professional development

• In sum, most traditional professional development focusing on “dissemination of information” not on “how to improve teaching practice, especially, classroom teaching practice”
How to improve teaching profession? (Continue)

- No classroom research, which in turn affect direction of where to go for training
- No empirical data or evidence to show how training affect learners’ development
- No system on teaching profession between pre-service teacher training and in-service teacher training
New classroom contexts/conditions

A teacher

How?

Every student

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What strategies were used to implement the practice?
Teaching Profession
(problem solving approach)

Recursive process between teaching profession and its development

Development of Teaching Profession
(Lesson Study)
Open Approach as the teaching approach

Posing open-ended problem

Students’ self learning

Summarization through connecting students’ mathematical ideas emerged in the classroom

Whole class discussion and comparison
Weekly Cycle of Lesson Study

Collaboratively Plan

Collaboratively Do

Collaboratively See
Educational values influencing Developments in Mathematics Education in Japan (1970s)

In Japan, as *Mathematical thinking* is the central issue in mathematics education since 1950s, the followings are some developments:

- Mathematical thinking first appeared in 1958 in Japanese Course of Study (COS, Ueda, 2013)

- Emphasizing on how to approach mathematical thinking both from ‘classroom teaching practices’ and ‘research perspectives’?
Developments in Mathematics Education in Japan (1970s)

In relation to classroom teaching practice, *Open-ended Approach* is developed in order to grasp and evaluate 'mathematical thinking', especially, higher-order thinking skills in mathematics.

In relation to classroom research, ‘Lesson Study’ has been used as a tool for teachers for doing classroom research to improve their daily teaching practices.
Movement of Problem Solving

In Japan

1958 mathematical thinking

1970s Open-ended Approach

In 1980 yearbook, it is appeared on NCTM agenda stated the important of problem solving as put it: Problem solving is the focus of school mathematics

**An Agenda for Action: Recommendations for School Mathematics of the 1980s** (NCTM, 1980)

**Curriculum and Evaluation Standards for School Mathematics** (NCTM, 1989)

**Principles and Standards for School Mathematics** (NCTM, 2000)
In Singapore 1992 curriculum, it emphasizes the importance of problem solving as illustrated in below figure.

Movement of Problem Solving

- Beliefs
  - Interest
  - Appreciation
  - Confidence
  - Perseverance

- Numerical calculation
- Algebraic manipulation
- Spatial visualisation
- Data analysis
- Measurement
- Use of mathematical tools
- Estimation

- Monitoring of one’s own thinking
- Self-regulation of learning

- Reasoning, communication and connections
- Thinking skills and heuristics
- Application and modelling
Mathematics provides a powerful means of communication which can be used to present information in figures, table, charts, graphs and symbols (CDD, 2006) and the process of communication is to be developed at the same time with the teaching of mathematics content together with other skills such as mathematical skills and problem solving.
Processes that are supposed to interweave with the teaching mathematical content in BRUNEI

(Madihah Khalid, 2010)
From the Malaysian Primary and Secondary School mathematics curriculum
A brief content analysis of the latest Integrated Curriculum for Secondary School Mathematics syllabus (2004) highlighted the following emphasis in the process of teaching and learning mathematics:
Movement of Problem Solving

In Malaysia

a) The need to link mathematics “learning to everyday life and experiences in and out of school”
b) The development of problem solving skill
c) The development of logical, systematic and creative thinking together with valid reasoning
d) The inculcation of intrinsic values of mathematics and values of the Malaysian society which include being systematic, accurate, diligent, confident, not wasteful, moderate and cooperative, all of which contribute becoming a responsible citizen.

(Lim Chap Sam, 2006)
**Section 22** Education shall be based on the principal 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.

**Section 24** In organizing the learning process, educational institutions and agencies concerned shall:
- provide substance and arrange activities in line with the learners’ interest and aptitudes, bearing in mind individual differences;
- provide training in thinking process, management, how to face various situations
- organize activities for learners to draw from authentic experience
- instructors able to benefit from research as part of the learning process.

**Section 25** The state shall promote the running and establishment, in sufficient number and with efficient functioning, of all types of lifelong learning resources.
Section 26 Educational institutions shall assess learners’ performance through **observation of their development; learning behavior** and result of the test accompanying the teaching learning process.

Section 27 The Basic Education Commission shall prescribe core curricula for basic education.

Section 30 Educational institutions shall also encourage instructors to carry out research for developing suitable learning for learners at different levels of education.
New teaching Approach

Students’ Ideas, from student’s eyes

investigate

Long-term Improvement

Teaching and Learning

Open-Ended Problem

Person Learning
Open Approach in Thailand

2002

Using Open-Ended Problems emphasized

To intrigue students’ thinking.
To encourage teachers to be aware of students’ ideas.

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Open Approach in Thailand (continue)

2003-2005

Development Of Mathematical Activity

To change teachers’ roles to support students instead of delivering knowledge.

To stimulate various students’ ideas.
To encourage teachers to recognize the importance of students’ learning by themselves with teachers’ support.
• Too much demand for delivering open-ended problems

• It is the time to introduce Lesson Study focusing on “teacher learning together” to create open-ended problems.
Open Approach and Lesson Study in Thailand

2006

Lesson Study with whole school approach using Math Textbook support
Students’ Individual Differences for mathematical learning have been ignored in classrooms.

Open Approach getting Started using:

- Open-Ended Problems
- To intrigue students’ thinking.
- To engage teachers to be aware of students’ ideas
- To change teachers’ roles to support students instead of delivering knowledge
- To stimulate various students’ ideas
- To encourage teachers to recognize the importance of students’ learning by themselves with teachers’ support

Why and how OA/LS in Thai Schools?

- 2002: Open Approach
- 2003-2005: Development Of Mathematical Activity
- 2006: Lesson Study

Textbook support
What types of support have been provided to motivate participants’ engagement at individual and institutional levels?
Collaboratively Plan

Teachers

Expert

School Coordinator

Thai Textbook

Japanese Textbook

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1 มีเด็ก 9 คน เล่นในกระรปร่าย และมีเด็ก 4 คน กำลังเล่นกระดาษเลื่อน มีเด็กทั้งหมดกี่คน
VDO Yamamoto
ประโยคสัญลักษณ์: \[ 9 + 4 = \]
7 จำนวนที่มากกว่า 10

1. มีแมลงปอสู่ท่าไหร่

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1. ผล

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อันดับแรกนี้ให้คิดแต่ละคนไปคนละ 1 กล่อง จากนั้นจัดแบ่งกล่องสุทธิตะคือ 12 เม็ด ให้เด็ก 3 คนถือ

\[ 12 \div 3 = 4 \]

มีลูกเต๋า 12 เม็ด ใน 1 กล่องดังนั้นจำนวนลูกเต๋าทั้งหมดที่

ให้เด็ก 1 คนจะได้คือ

\[ 12 + 4 = 16 \]
The sample of the CRME Lesson Study Project Textbooks under the Ministry of Education, Thailand, with support of the CRICED, University of Tsukuba, Japan

CEM ศูนย์ความเป็นเลิศด้านคณิตศาสตร์พัฒนาหนังสือเรียนอิเล็กทรอนิกส์ (Dbook) ศูนย์วิจัยคณิตศาสตร์ศึกษา มหาวิทยาลัยสุรนารีระดับสูง ความเป็นเลิศด้านคณิตศาสตร์พัฒนาโปรแกรมหนังสือเรียนอิเล็กทรอนิกส์ (Dbook) และได้รับการสนับสนุนจาก CRICED, University of Tsukuba, Japan นักอุทิศสรรพคณาจารย์ที่มีประสบการณ์ทางรายวิชาที่มีฝีมือดี หนังสือเรียนอิเล็กทรอนิกส์ (dbook) สำหรับการเรียนรู้ของครูศึกษาธิการ ผู้บริหารสถานศึกษา นักเรียนระดับชั้นประถมศึกษาถึงมัธยมศึกษา และผู้ปกครองโดยมีตัวอย่าง VDO หนังสือเรียนรับฟังเรียนออนไลน์ได้โดยง่าย ระดับชั้นประถมศึกษาปีที่ 4 วิชาคณิตศาสตร์ เรื่องการหาร สอนโดย นางสาวสุทธิราช ธรรมสิริ นักศึกษา ฝึกปฏิบัติการสอน สำนักวิชาวิทยาศาสตร์ศึกษา คณะศึกษาศาสตร์ มหาวิทยาลัยขอนแก่น และมีการแนะนำการใช้หนังสือเรียนอิเล็กทรอนิกส์ (Dbook) บน iPad, Samsung Galaxy Tab และ Smartphone ระบบปฏิบัติการแบบ Android

ตัวอย่างหนังสือเรียนอิเล็กทรอนิกส์ (Dbook) G4-C1 (Division) [หนังสือเรียนชั้นประถมศึกษาปีที่ 4 เล่ม 1 เรื่องการหาร] Hot
G6-C2 (Fraction) [หนังสือเรียนชั้นประถมศึกษาปีที่ 6 เล่ม 2 เรื่องเศษส่วน] Hot

Demonstration Class for Dbook [mp4] [Youtube] [flv]

How to use Dbook
How to use dbook on Galaxy Tap [mp4] [Youtube] [flv]
How to use dbook on ipad [mp4] [Youtube] [flv]
How to use dbook on Telephone [mp4] [Youtube] [flv]

dbook Original Site in Japan for Exemplar
http://math-info.criced.tsukuba.ac.jp/museum/dbook_site/ Hot

dbook Original Site in Japan for Manual (Old Edition)
Collaboratively Do

Observer

Teacher
Collaboratively Reflection

Principal
Expert
Teachers
Teachers
Graduate Student
School Co.

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Describe plans for scaling up and sustainability
2009-2010

1. Khon Kaen (6)
2. Chaiyaphum (1)
3. Sakhon Nakhon (1)
4. Ubon Ratchathani (4)
5. Chiang Mai (3)
6. Lampang (1)
7. Lamphun (1)
8. Phisanulok (1)
9. Kalasin (1)
10. Nakhon Ratchasima (1)
11. Susin (1)
12. Bungkan (1)
1. Khon Kaen (8)*
2. Chaiyaphum (1)
3. Sakhon Nakhon (1)
4. Ubon Ratchathani (7)*
5. Chiang Mai (4) *
6. Lampang (1)
7. Lamphun (2) *
8. Phisanulok (1)
9. Kalasin (1)
10. Nakhon Ratchasima (1)
11. Susin (1)
12. Bungkan (1)
Higher-Order Thinking in Mathematics Project supported by Bureau of Budget

1. Khon Kaen
2. Chaiyaphum
3. Sakhon Nakhon
4. Ubon Ratchathani
5. Kalasin
6. Nakhon Ratchasima
7. Susin
8. Bungkan
9. Nongkhai
10. Nakhonphanom
11. Nongbualamphu
12. Burirum
13. Mahasarakham
14. Mukdahan
15. Yasothon
16. Roiet
17. Sisaket
18. Amnatcharoen
19. Udonthani
How do you monitor the progress / impact?
Number of Schools implemented LS/OA

2002 (2) Pioneered Schools for introducing Open Approach

2003-2005 School-Based Training with workshops

2006-2013 (85) School-Based Lesson Study with incorporating Open Approach

- 2003-2005 for the Development Of Mathematical Activity


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ทัศนียภาพห้องเรียนต้นแบบ: ห้องประชุมหรือห้องถ่ายทอด
ทัศนียภาพห้องเรียนต้นแบบ: ห้องประชุมหรือห้องถ่ายทอดและห้องควบคุม
ทัศนียภาพห้องเรียนต้นแบบ: ห้องปฏิบัติการเพื่อศึกษาขั้นเรียน
ทัศนียภาพห้องเรียนต้นแบบ: ห้องปฏิบัติการเพื่อศึกษาชั้นเรียน
ทัศนียภาพห้องเรียนต้นแบบ: ห้องปฏิบัติการเพื่อศึกษาชั้นเรียน
Open Class in EARCOME 6, March 12-13, 2012
One teacher from project school in NE taught first grade students in Phuket Province
Eventually, Students’ self-learning happened
More exiting students engaged in
1 มีเด็ก 9 คน เล่นในกระสอบระย และมีเด็ก 4 คนกำลังเข็นกระดาษเลื่อน
มีเด็กทั้งหมดกี่คน
Students’ ideas: Grade 1

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7 + 5 - 8 = 4
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3 + 2 = 5
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10 - 2 = 8
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12 - 8 = 4
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2 + 4 = 6
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\[
10 - 8 = 2
\]
NT Scores: Grade 3
Kookhampittayasan School

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<tr>
<th>Subject</th>
<th>2009</th>
<th>2010</th>
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</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>52.5</td>
<td>87.38</td>
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<tr>
<td>Science</td>
<td>41.86</td>
<td>80.95</td>
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<tr>
<td>Thai</td>
<td>45.83</td>
<td>70</td>
</tr>
</tbody>
</table>
O-NET Scores

Kookhampitayasan School

ONET-Mean


13.56 38.87 37.45 43.76 37.14 34.85 78 78


13.56 47.55 43.76 37.14 34.85 78 78

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Changed with Teachers

Collaboratively Plan

Collaboratively Do

Collaboratively See

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Mrs. Chaweewan
(4th Grade teacher, teaching experience 29 years)

“I was uncomfortable when I first joined the project, but in the second semester after joining the project I’ve been enthusiastic, created teamwork, recognized what are my weak points. Moreover, students have been more self-confident and concentrated to do activities. Students who could not learn well but now always join the activities instead of trying to be outside the classroom as in the past when the teaching approach has been applied in the classroom. Students usually ask their teacher what kinds of activities to be used in their classroom and be enthusiastic for cooperating with their friends to do classroom activities.”

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Mr. Somjai Maneewong, PhD
(Kookam Pittayasan School Principal of first pioneered school)

“We considered an assessment aspect of open approach. We’ve realized that students have been gradually changed each year. The students are more confident to think and speak. Especially, the change in NT, O-Net and A-NET scores that have tended to improve even they’re not so high but we’ve been appreciated that students showing great development.”
1. Students can rethink and apply what they've learned
2. Expected students ideas
3. Estimated students inappropriate ways to find the answer and provide guidance and hints for students who use those methods
4. Teachers walk across the room and observe students, to ensure that students are used materials for solving mathematical problems
5. Taking note in to diary and keep to be methods in presentation

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Teachers knowledge about mathematical ideas and management of mathematical ideas

3.1 knowledge about students mathematical ideas that represent during solving the problems
3.2 knowledge about teacher mathematical ideas
3.3 Connection mathematical ideas that represent during solving the problems
3.4 Ranking students mathematical ideas that represent during solving the problems

Teacher’s level of knowledge before joining the project.
Teacher’s level of knowledge after joining the project.

- 3.1: 52% before, 72% after
- 3.2: 53% before, 75% after
- 3.3: 51% before, 72% after
- 3.4: 53% before, 73% after
Teacher’s Knowledge of Subject Matter and Teaching

Teacher’s level of knowledge before joining the project.

Teacher’s level of knowledge after joining the project.

5.1 Knowledge of teaching design
5.2 Knowledge of ordering subject matter for teaching
5.3 Knowledge of assessing good points and bad points of representation for teaching
5.4 Knowledge of posing questions for students’ learning

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Conclusions

How to adapt innovation?

New Application of Lesson study and open approach

Created weekly cycle

How to introduce into Thai school?
Weekly cycle is used as an innovation for a regular meeting of the teachers every week.

Teaching revised lessons in the weekly cycle seem to be difficult for the teachers. Thus, moving "revise the lesson", into a yearly cycle made the teachers feel comfortable to do lesson study.
How to introduce into Thai school?

- **Open Approach** (2002)
- **Development Of Mathematical Activity** (2003-2005)
- **Lesson Study** (2006)

*Open-Ended Problem*
Concluding remarks

Since 2002, Lesson Study and Open Approach have been expanded covering 22 of 77 provinces of Thailand. And being prepared to expand across the country including the central and the southern parts of the country.
The way Lesson Study and Open Approach have been introduced is quite unique. That is, in order to do "Kyozaikenkyu", translated Japanese mathematics textbooks have been used as major activity of lesson study’s cycle.
Concluding remarks

As a result, most of the teachers even those who are non-majoring in mathematics have improved their pedagogy content knowledge (PCK) in Mathematics.
Series on Mathematics Education - Vol 3

**LESSON STUDY**

Challenges in Mathematics Education

edited by

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**Patsy Wang-Iverson**  
(*Gabriella & Paul Rosenbaum Foundation, U.S.A.*) &

**Ban Har Yeap**  
(*Marshall Cavendish Institute, Singapore*)

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HC: US$68.60*  
SC: US$33.60*

*All prices shown are after 30% discount.
Movement on Mathematics Education in Thailand.

Establishment of Thailand Society of Mathematics Education (TSMEd) on September 27, 2014.
World Association of Lesson Studies International Conference 2015 in Khon Kaen, Thailand

LESSON STUDY FOR IMPROVEMENT OF CLASSROOM QUALITY

November 23–26, 2015

Venue: Khon Kaen University, Khon Kaen, Thailand

30 November 2014
First Call for Papers

28 February 2015
Second Call for Papers

1 May 2015
Deadline for abstract submission

30 August 2015
Deadline for early bird registration

30 September 2015
Deadline for regular registration

1 July 2015
Notification of acceptance

23 November 2015
Expert Seminar (By Invitation) and School Visit

24 – 26 November 2015
WALS International Conference 2015
Thank you for your attention