Lesson Study incorporating Open Approach:

Two practices in Community of Practices to improve Quality of Classroom

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Dujiangyan Dam,
Chengdu, Sichuan
Mount Qingcheng and the Dujiangyan Irrigation System

Construction of the Dujiangyan irrigation system began in the 3rd century B.C. This system still controls the waters of the Minjiang River and distributes it to the fertile farmland of the Chengdu plains.
Mount Qingcheng and the Dujiangyan Irrigation System

Mount Qingcheng was the birthplace of Taoism, which is celebrated in a series of ancient temples.
You make eternal happiness by your creation
Anlan bridge

The bridge is 281 metres long across both the inner river and the outer river. It was called Zhupu Bridge in ancient times and was rebuilt in the Song Dynasty and called Pingshi Bridge. In the late Ming Dynasty (1368-1644), it was burned in a war. In the 8th year of Jiaqing Reign (1803 A.D.) Of the Qing Dynasty, He Xian, native, and his wife proposed rebuilding it and as a result the people on both banks could cross the raging waves in safety, hence it was called Anlan Bridge and also called Couple Bridge at that time.
What I have learned from this world heritage?

Creation or Design and dedication values for community

We want this kind of "Education"
The term “lesson study” is first used by Lewis and Tsuchida (1997) for the Japanese “Jugyo Kenkyu” and became popular word when Stigler and Hiebert (1999) used in “Teaching Gap.”
First developed as an educational practice in the Meiji period of Japan, Lesson Study functions as a means of enabling teachers to develop and study their own teaching practices. (Takuya Baba, 2007)
Figure 2: Moral Education Class at Kijō Elementary School (1910)
(Source: Kijō Elementary School Archive, used with permission).
Figure 2. ‘Reform the Methods of Teaching’ (1883)

(Isoda, 2010)
Figure 3. Problem Posing Approach by Jingo Shimizu (1924)
Appendix A: Unit Lesson Plan of 5th Grade Geography Classroom Lessons for Lesson Study at Kijō Elementary School (September 1930)
BOR WORN
Home, Temple and School (HTS) Organization: The Learning Organization in the Communities of Thailand
Wat Mahannapharam School

Established 1884.

King Rama V
These craft works originated by a variety of communities of practices
Thai Society has become realized that we were blind sight and has been trying to bring our spirit back to this society.

School education is one among other things of the blind sight.
Thus, I personally started the 30 years project of school education reform.

Since 2001, the year that I completed my Ph.D. from the University of Tsukuba, where I used to study for 8 years. And a number of my friends and teachers during those time are being here to support me in this long-term projects.
Today, it is 15 years, half of this long journey and I am very happy to take this chance to looking back

What I have done during this 15 years
What I have learned from this long experience is that if we want someone to learn something, create a community for them to participate/engage in.

To me, the idea of Community of Practice (COP) put by Lave and Wenger (1981, 1991) is very useful, practical, and appropriate for creating “a new model for teacher education program in 2004”.

What kinds of “Practices” we need for......

Certainly, on the one hand an answer is “Classroom Teaching Practice (CTP)”

BUT

This is not enough. One the other hand, we need “Another Practice”
What kinds of “Another Practice” we need...

“Another Practice” we need is the one to improve “Classroom Teaching Practice”

To me, this one, for most of the teachers, rarely think about it.

Can you imagine it?
Yes, it is “Professional Development.”
So, what does a model for these two practices look like?

Classroom Teaching Practice:
Teaching Mathematics in a traditional way

To improve the classroom teaching practice by PD type such as a sort of short course training

(Inprasitha, 2014)
An Example: A traditional teaching approach we are so familiar with... and Its PD

A teacher demonstrating, questioning, describing, lecturing, etc., transmit

Students memorizing

Contents

Inprasitha, 2011
However, what if, these two practices are not what we are looking for BUT still being practiced by the teachers?
Collapse of Traditional Teaching

In Thailand, (Inprasitha, 2006)
Collapse of Traditional Teaching

In Korea

In Japan

Sato Manabu, 2014
Unfortunately,

In most countries around the globe, school teachers have been ignored to do undesirable or without any useful practices instead of encouraging them to participate in “a community of practice” that useful for them and their students.
Thus, what are the problems with the above-mentioned model?

• There is a big gap between these two practices.
• Effect on each other is so “minimal”
• No regularity or continuity on these practices.
• Less obvious “community” for teachers to participate in
• More importantly, teachers themselves are not aware of these practices as tools for their participation in the so-called “Professional Development Community” or “Professional Learning Community”, which we all are looking for.

etc.,
Worse situation because new demanding skills for the 21\textsuperscript{st} Century are........

Examples of new demanding skills such as thinking skills or communication skills to live in the 21\textsuperscript{st} Century
New Demanding Skills for the 21st Century

This graph shows the recognition of which are less demanding skills and are more demanding skills.

However, in most countries around the globe still focus on the blue graph instead of red graph.
In respond to the above-mentioned demanding skills, what a classroom look like?
New classroom conditions

A teacher

How?

Every student

Think

Think

Think

Think

Think

Think

Think
So, How to create “new classroom teaching practice” and “the way to improve it?”

Looking back into the history should be the best choice and hopefully be useful. Thus, while I was in Japan for more than 10 years, I then look back into the history of mathematics education in Japan and found two distinguished “developments on practices” during the four decades since 1950s.
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 COS (Ueda, 2013)
- Emphasizing on how to approach mathematical thinking both in ‘Classroom Teaching Practice’ and ‘Research Practice’?
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 research practice, ‘*Lesson Study*’ has been used as a tool for teachers for teacher to learn together to improve their daily teaching practices.
Mathematical thinking as a global goal of teaching mathematics from elementary school level.

- Focusing on 'mathematical thinking' through analysis of 'classroom activity' (i.e., classroom is used as a unit of analysis)
- "Open-ended Approach' is developed as a teaching approach to engage students in mathematical thinking.
<table>
<thead>
<tr>
<th>Year</th>
<th>Topic of Lesson Study</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>1880s</td>
<td>Pestalozzi Method and Dialogue Method (including argumentation between teacher and students)</td>
<td>Not only limited to mathematics.</td>
</tr>
<tr>
<td>1910s</td>
<td>Mathematics for Life (including problem posing)</td>
<td>Not only limited to mathematics.</td>
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<tr>
<td>1930s</td>
<td>Curriculum Integration in Mathematics (including Open-Ended Problems)</td>
<td>From 1900s</td>
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<td>1950s</td>
<td>Core curriculum movement based on the social study</td>
<td>Under the occupation after WWII.</td>
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<td>1960s</td>
<td>Mathematical Thinking (Japanese way of New Math.)</td>
<td>Related with New Math</td>
</tr>
<tr>
<td>1970s</td>
<td>Open-Ended Approach and Problem Solving Approach</td>
<td>For developing Mathematical Thinking</td>
</tr>
<tr>
<td>1980s</td>
<td>Problem Solving</td>
<td>Related with US</td>
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Isoda, M. (2010)
Enculturation of new classroom culture for every student can think by themselves.
• Focus on “ways of thinking or students’ ideas?” by treating students’ individual differences as resources for “collaborative learning”
• Reconceptualizing of time period as a tool for collective meaning of development of understanding
• Managing classroom time for all students to solve one particular problem (not many various problems) from various points of views?
• Engaging students in their own or authentic problems
  etc.,
New teaching Approach

Teacher

Student’s Ideas, from student’s eyes

Long-term Improvement

Teaching and Learning of Both teachers and students

Open-Ended Problem

Personal Learning
Teaching Profession
(Classroom Teaching Practices)

System of Development of Teaching Profession

Development of Teaching Profession
(How to improve teaching?)
Teaching Profession (Focusing on contents)

System of Development of Teaching Profession

Development of Teaching Profession (Training for improve contents)
Teaching Profession (Focusing on Students’ problem solving)

System of Development of Teaching Profession

Development of Teaching Profession (Lesson Study)
Four phases of Open Approach as Teaching Approach

1. Posing open-ended problem
2. Summarization through connecting students' mathematical ideas emerged in the classroom
3. Students' self learning through problem solving
4. Whole class discussion and comparison

Inprasitha, 2011
Adaptive LS as a Methodology

Weekly Cycle

- Collaboratively design research lesson (Plan)
- Collaboratively observing the research lesson (Do)
- Collaboratively reflection in teaching practice (See)

Lesson Study as a Methodology

established small partnerships among principal, teachers, graduate students
Inprasitha, 2010
Introducing Open Approach as "mathematical activity" in terms of "Open-ended problem" with 15 student teachers.

More than 800 teachers in Khon Kaen area had been trained to teaching students to think by/for themselves via solving opened-problems.

2000-2005

Introduce the first Practice
Lesson study has been introduced into 2 project schools by incorporated into open approach.

The way Thailand supports school teachers to change the way they teach to teaching using mathematical activity based on open-ended problems has been institutionalized into Thai school culture.
Since 2006

Thailand experiences to adapt lesson study have been shared in APEC members economy via APEC Lesson Study
In 2007

Lesson study schools have been increased to 4 schools and started first community of lesson study by sharing experience through Open Class in the end of semester.
Scenario at 1st year project school
Kookhampittayasan school

School principal and teachers set schools’ timetable/schedule for plan, do, see process.

Plan Lesson on Tuesday

Plan Lesson on Tuesday

See

Reflect on Thursday
Scenario at 1st year project school
Chumchonban chonnabot school

Plan
Lesson on Monday

Plan

See

Do

Reflect on Wednesday
Scenario at 2nd year project school
Banbuengniumbuengkrainoon school

Plan
Plan Lesson on Tuesday

See

Do

Reflect on Thursday
Scenario at 2nd year project school
Nongtoom Nongngooluem school

Plan Lesson on Monday

Plan

See

Do

Reflect on Wednesday
5 years later expansion

4 schools

to

23 schools
• expansion of implementation of LS and OA in 23 pilot schools (13 in North East area and 6 in North area of Thailand).

2009-2012

1. Khon Kaen (7)
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)
25 days for induction workshop at Kosa Hotel, Khon Kaen

In-service Teachers used Open Approach in Mathematics Classroom
Expansion of Lesson Study and Open Approach in 7 pilot schools (5 in North East area and 2 in North area of Thailand) supported by CEM.

Attached School’s Workshop

Workshop for using Textbook
There were 30 pilot schools participated the “Project of Professional Development by using Lesson Study and Open Approach”, launching by CRME.
Open Class: The Activity for Expanding the Implementation of LS and OA
2013: KKU had conducting the “Project on Eliminating Education and Public Health Problems in the Isaan Region for Reducing Social Inequality”.

CRME had launching the sub project “Higher-order Thinking in Mathematics Project in Northeast (HTMP-Northeast)”
50 schools from 20 provinces in North East of Thailand, participated in this project.
Theoretical Framework for design
Mathematical Activities (Traditional)

Real World

Transfer

Mathematical world
Real World → Transfer → Mathematical world
Two birds
Two trees
Two mangos
Three watermelons

Three chairs

Three lotus
No orange, can be said “there is zero orange.” and Zero is denoted by 0.

No bird, can be said “there is zero bird.” and Zero is denoted by 0.

No fish, can be said “there is zero fish.” and Zero is denoted by 0.
Theoretical Framework
For design Mathematical Activities (New)

Real World

Mathematical world

Task/Problem situation

Mathematical Modeling

Problem Solving
Real World

Think by themselves in other fields
Such as mathematical thinking, scientific thinking, creative thinking

Through problem solving (OA)

Life Long Learning

In textbook

Task/Problem situation
10 years for adaptive innovations to improve the quality of classroom in KOOKHAM PITTAYASAN SCHOOL
New Classroom Culture: Foundation of Change from Product Oriented Society to Product-Process Oriented Society

Open Approach and Lesson Study: Innovations for building New Classroom Culture
シラータセリテリアル
บุญสมมาบุษฐาน้า

23-25 พฤศจิกายน 2558
ณ บริเวณปิงลิ้น มหาวิทยาลัยของแห่ง

ดุ่มสีขาว
25 พฤศจิกายน 58

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<th>3. นักเรียน 4 ราย</th>
<th>4. นักเรียน 3 ราย</th>
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หมายเหตุ: รายละเอียดเพิ่มเติมเกี่ยวกับการประชุมทางคณิตศาสตร์สามารถดูเพิ่มเติมได้ที่ 25 พฤศจิกายน 58.
Thank you for your attention