



# Open Approach *from Thailand*

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# 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 COS (Ueda, 2013)
- Emphasizing on how to approach mathematical thinking both in '**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.



# Endeavors in Mathematics Classroom in Japan

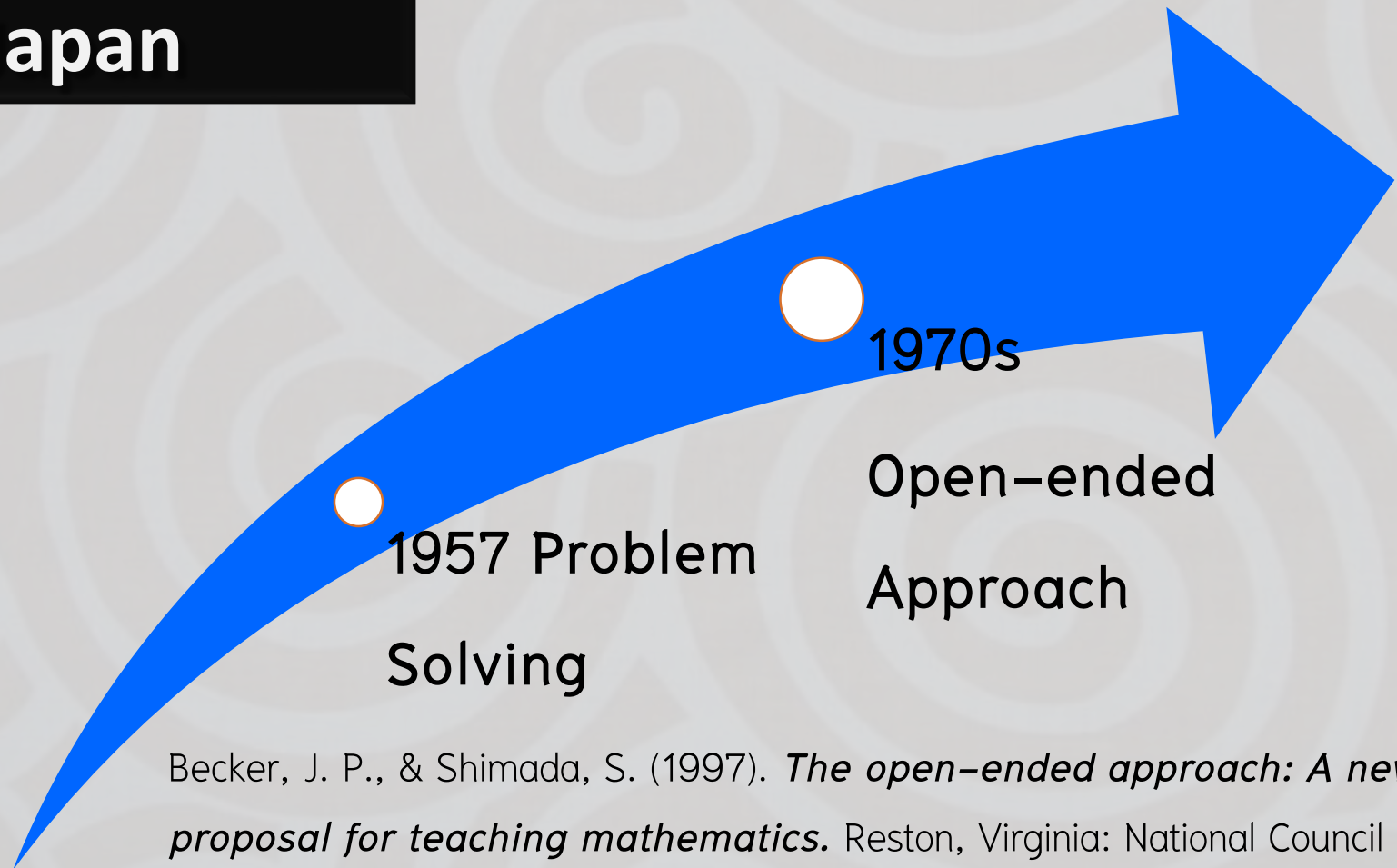
***Mathematical thinking as **a global goal of teaching mathematics from elementary school level.*****

- 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.

Year	Topic of Lesson Study	
1880s	Pestalozzi Method and Dialogue Method (including argumentation between teacher and and students)	Not only limited to mathematics.
1910s	Mathematics for Life (including problem posing)	Not only limited to mathematics
1930s	Curriculum Integration in Mathematics (including (including Open-Ended Problems)	From 1900s
1950s	Core curriculum movement based on the social social study	Under the occupation after WWII.
1960s	Mathematical Thinking (Japanese way of New New Math.)	Related with New Math
1970s	Open-Ended Approach and Problem Solving Approach	For developing Mathematical Thinking
1980s	Problem Solving	Related with US

# Movement of Problem Solving

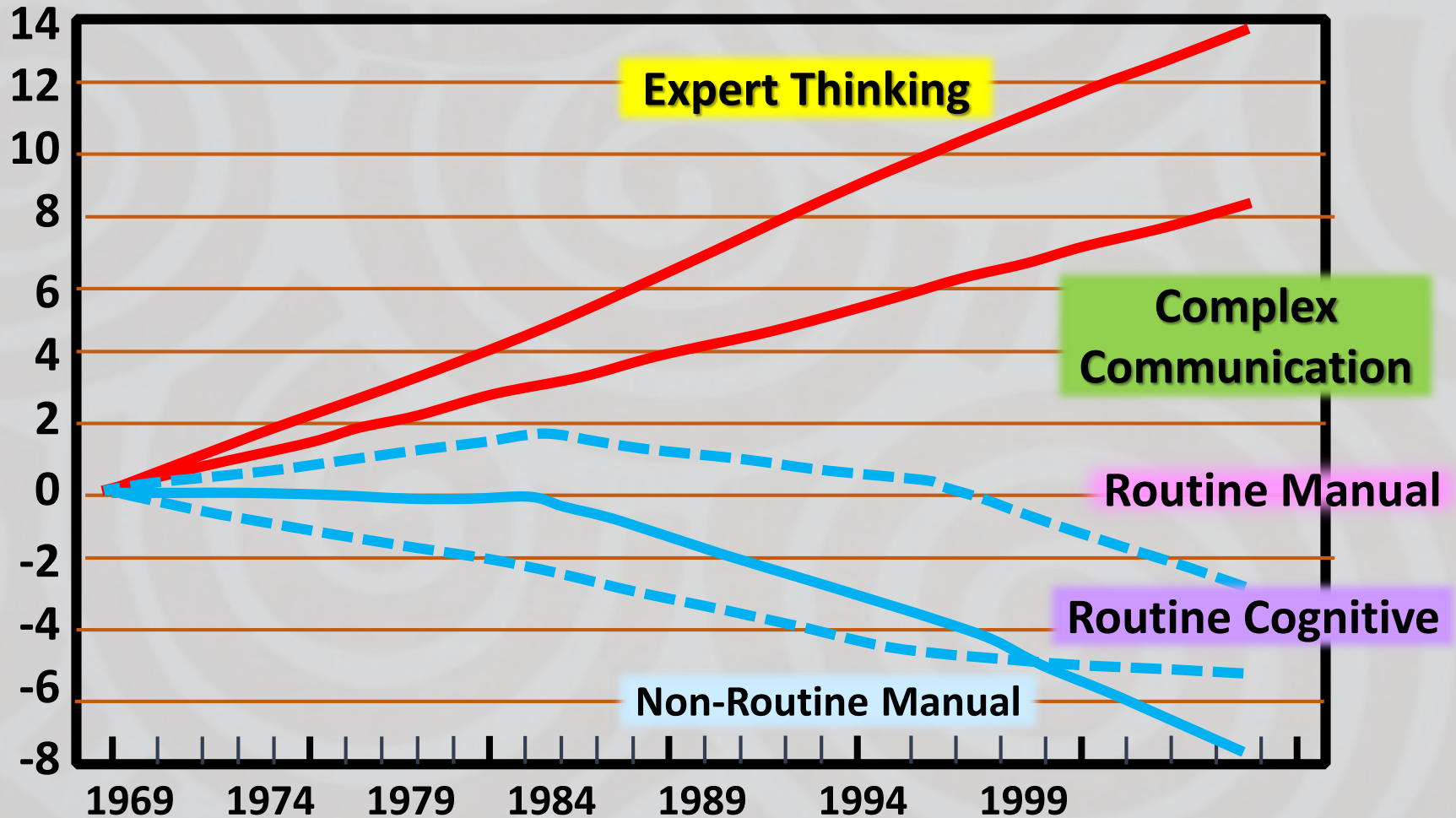
## In Japan



Becker, J. P., & Shimada, S. (1997). *The open-ended approach: A new proposal for teaching mathematics*. Reston, Virginia: National Council of Teachers of Mathematics.



# Demand for the 21<sup>st</sup> Century skills



**Source:** Levy and Murnane (2004). *The new division of labor: How computers are creating the next job marketing.* Princeton University Press



**Teaching Profession  
(Classroom Teaching Practices)**

**System of Development of  
Teaching Profession**

**Development of Teaching Profession  
(How to improve teaching?)**

(Inprasitha, 2014)



**Teaching Profession  
(Focusing on contents)**

**System of Development of  
Teaching Profession**

**Development of Teaching Profession  
(Training for improve contents)**

(Inprasitha, 2014)

**Teaching Profession  
(Focusing on Students'  
problem solving)**

**System of Development of  
Teaching Profession**

**Development of Teaching Profession  
(Lesson Study)**

(Inprasitha, 2014)

# 2000-2005

Introducing Open Approach as  
"mathematical activity" in terms  
of "*Open-ended problem*".



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





# Since 2006

**Lesson study has been introduced into 2 project schools by incorporated into open approach.**

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








# In 2007

Lesson study schools have been increased to 4 schools and Thailand experiences to adapt lesson study have been shared in APEC members economy via ....ชื่อโครงการปีแรก



-  Kookhampittayasan school
-  Chumchonban chonnabot school
-  Nongtoom Nongngooluem school
-  Banbuengniumbuengkrainoon school



# Scenario at 1<sup>st</sup> year project school

## Kookhampittayasan school

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

### Plan

Plan Lesson on Tuesday



### See



### DO



### Reflect on Thursday





# Scenario at 1<sup>st</sup> year project school

## Chumchonban chonnabot school

Plan

Plan  
Lesson  
on  
Monday



Do



See

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



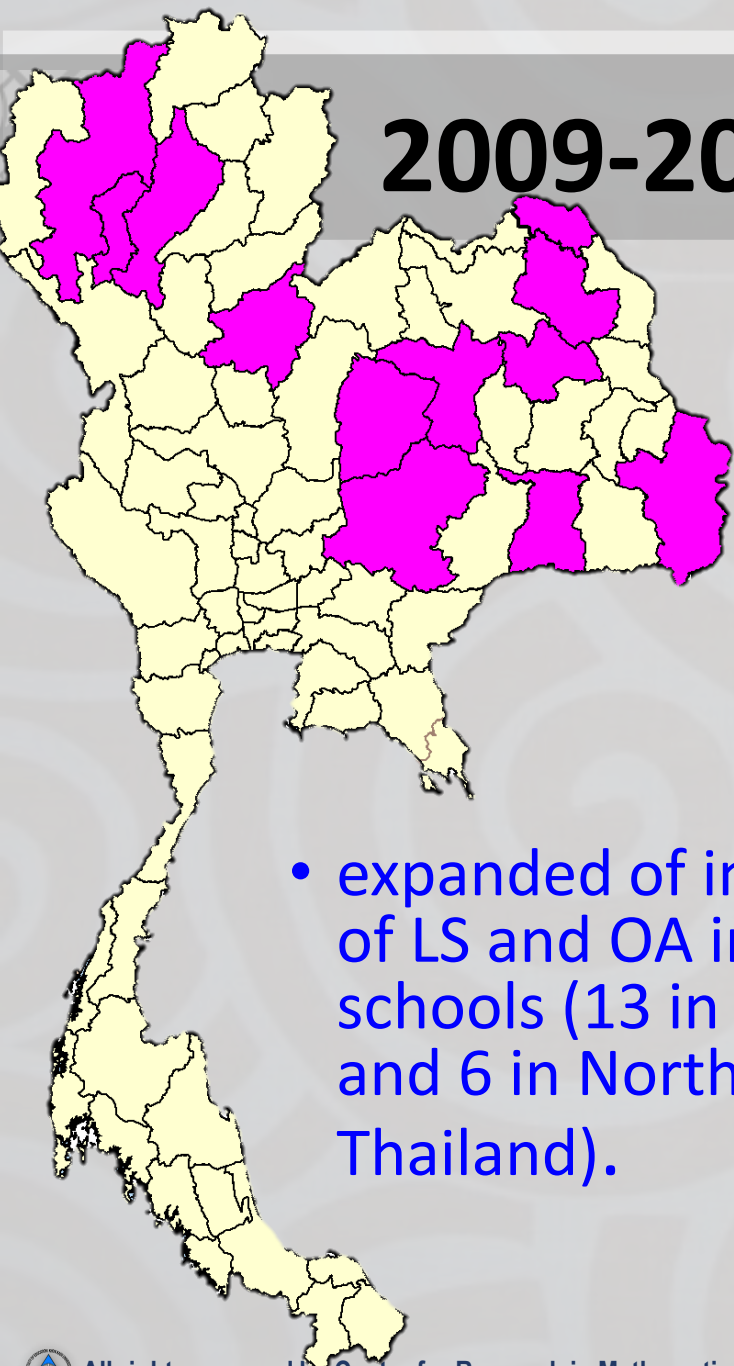
Plan Lesson  
on Monday



Reflect on Wednesday



# 2009-2010



- expanded of implementation of LS and OA in 19 pilot schools (13 in North East area and 6 in North area of Thailand).

1. Khon Kaen (6)
2. Chaiyaphum (1)
3. Sakon 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 initial workshop at Kosa hotel, Khon kaen



**In-service Teachers used Open Approach in Mathematics Classroom**

# 2011

expanded of implementation of LS and OA in 7 pilot schools (5 in North East area and 2 in North area of Thailand).



Attached School's Workshop



Workshop for using Textbook



# 2012

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



- 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)”



# 2013

50 schools from 20 provinces in North East of Thailand, participated in this project.







**Summarizing  
through connection  
students' ideas**

**Posing Open-  
ended Problem**

**PLAN**

**SEE**

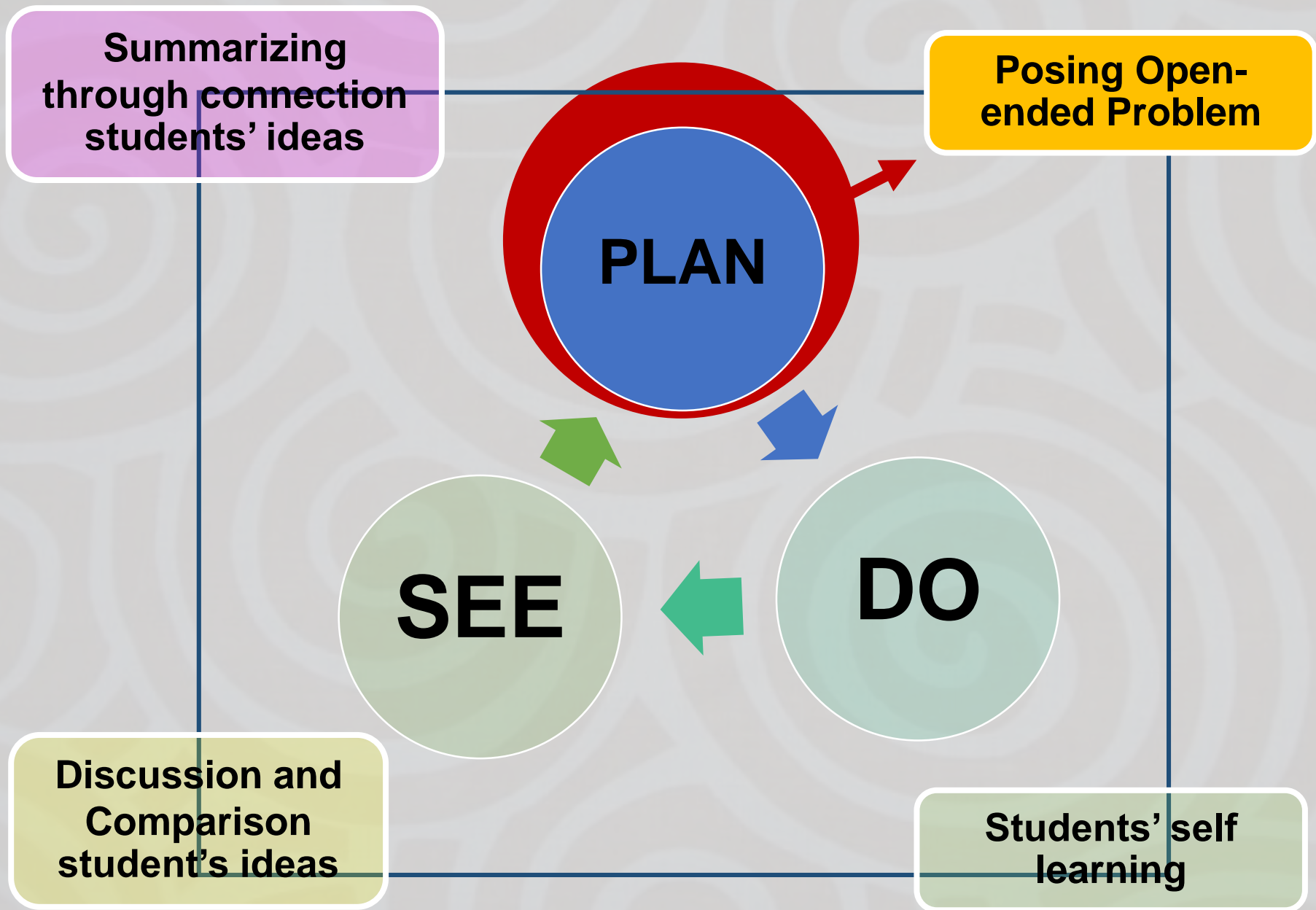
**DO**

**Discussion and  
Comparison  
student's ideas**

**Students' self  
learning**







# ***Plan*** & Posing Open-ended Problem

1) read tasks in textbook together

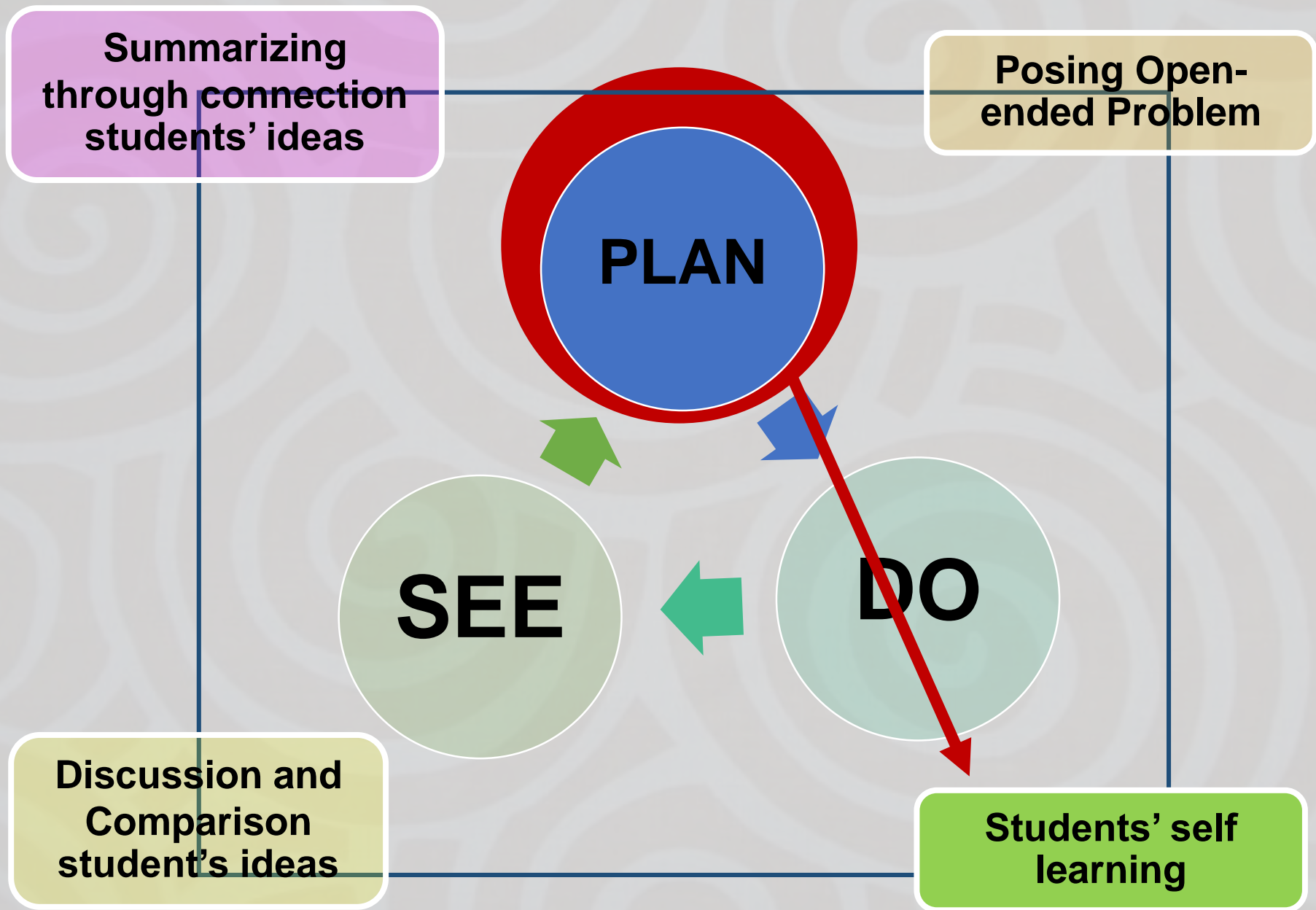
2) What is problem situation?

The way of how to design a suitable problem situation has to use **students' ideas**, not a pattern

3) What is an objective?

4) What is subject matter underneath the problem situation?



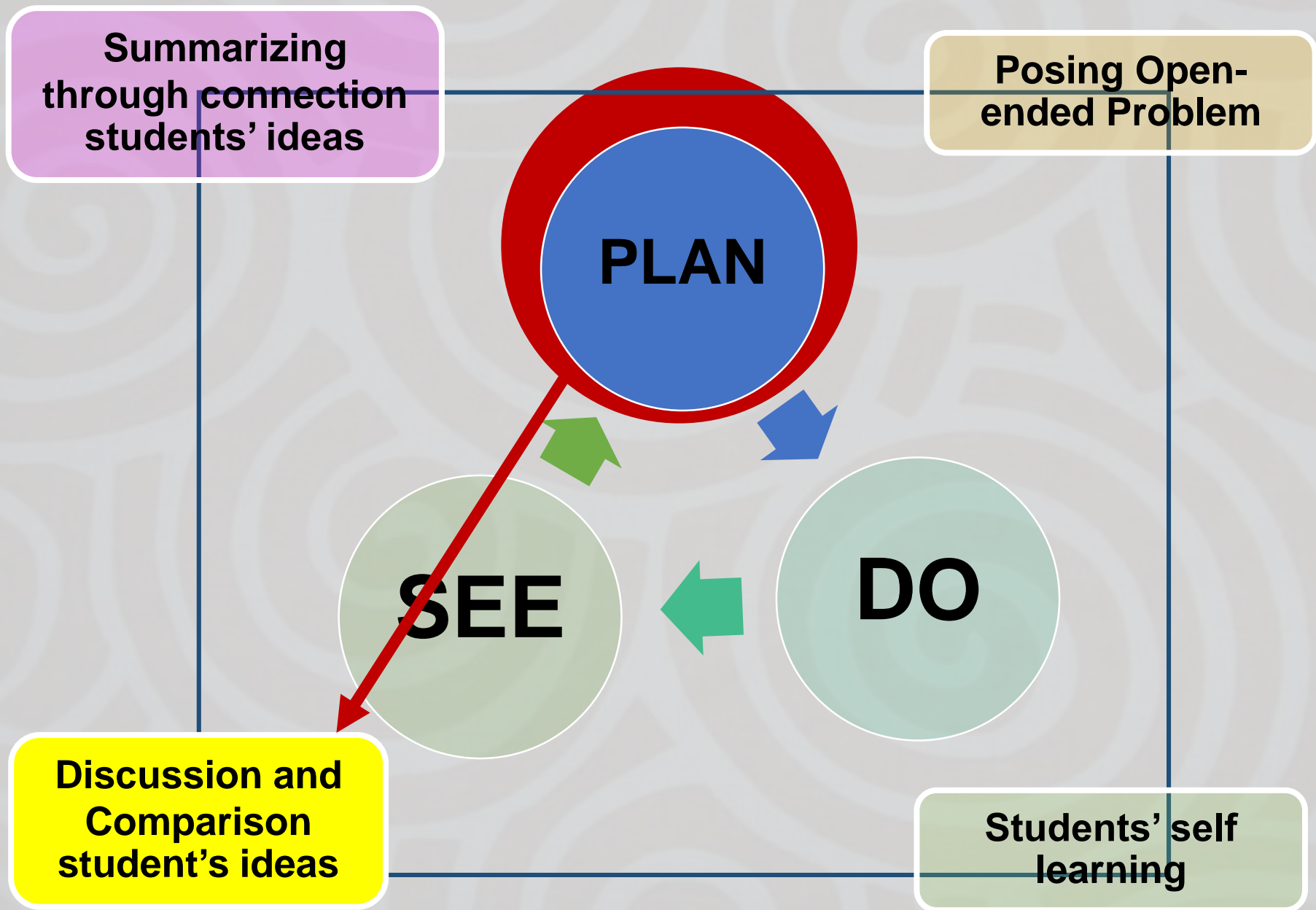


# ***Plan*** & Students' self learning

- 1) Anticipating students' ideas
- 2) Anticipating students' difficulties
- 3) Time

Supervisors must participate to help teachers to design lessons, especially in a subject matter in which teachers have difficulties and anticipate the students' difficulties

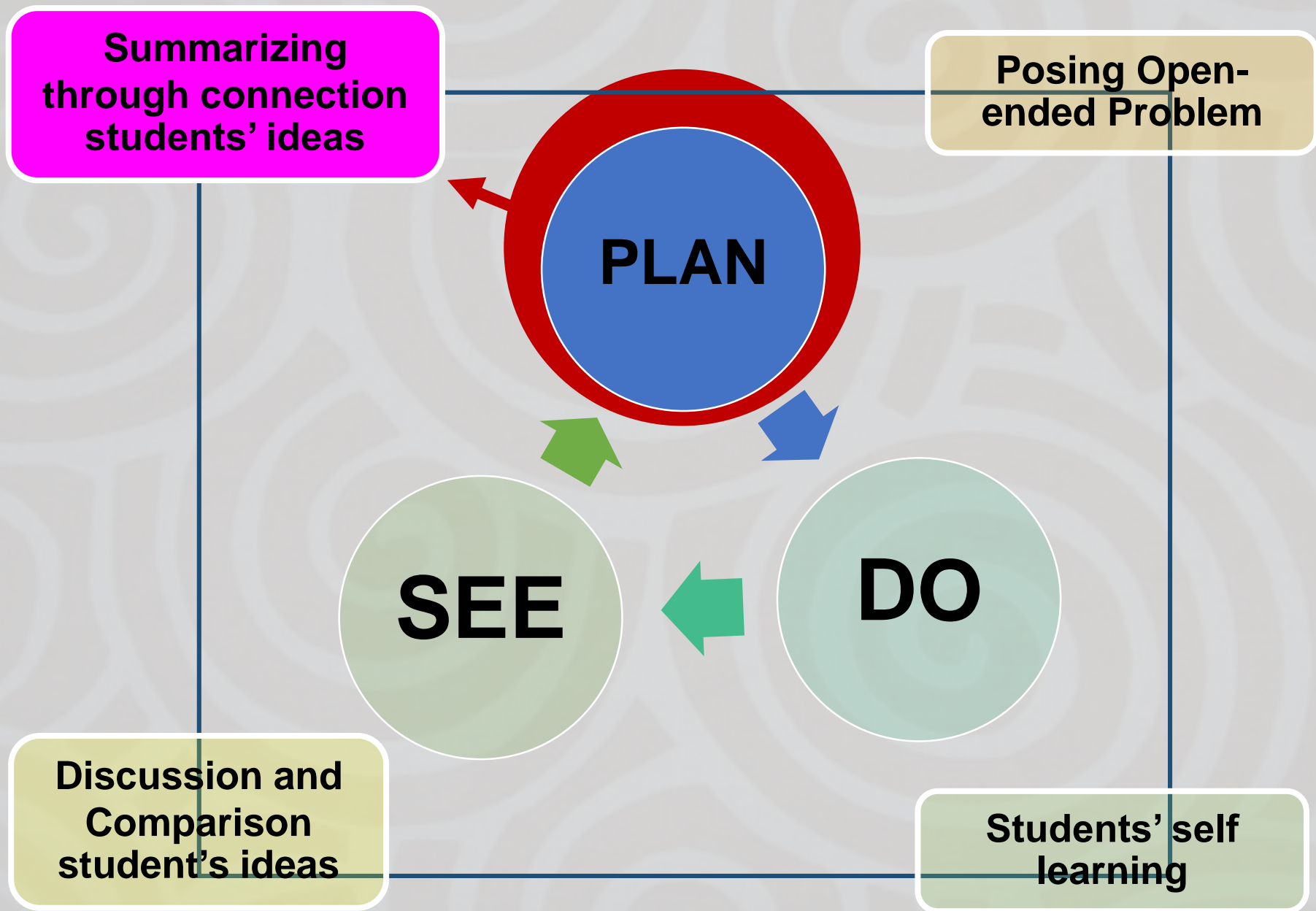




# ***Plan*** & Comparison and Discussion

- 1) Managing students' ideas
- 2) Extending students' ideas with any representations such as diagrams, figures

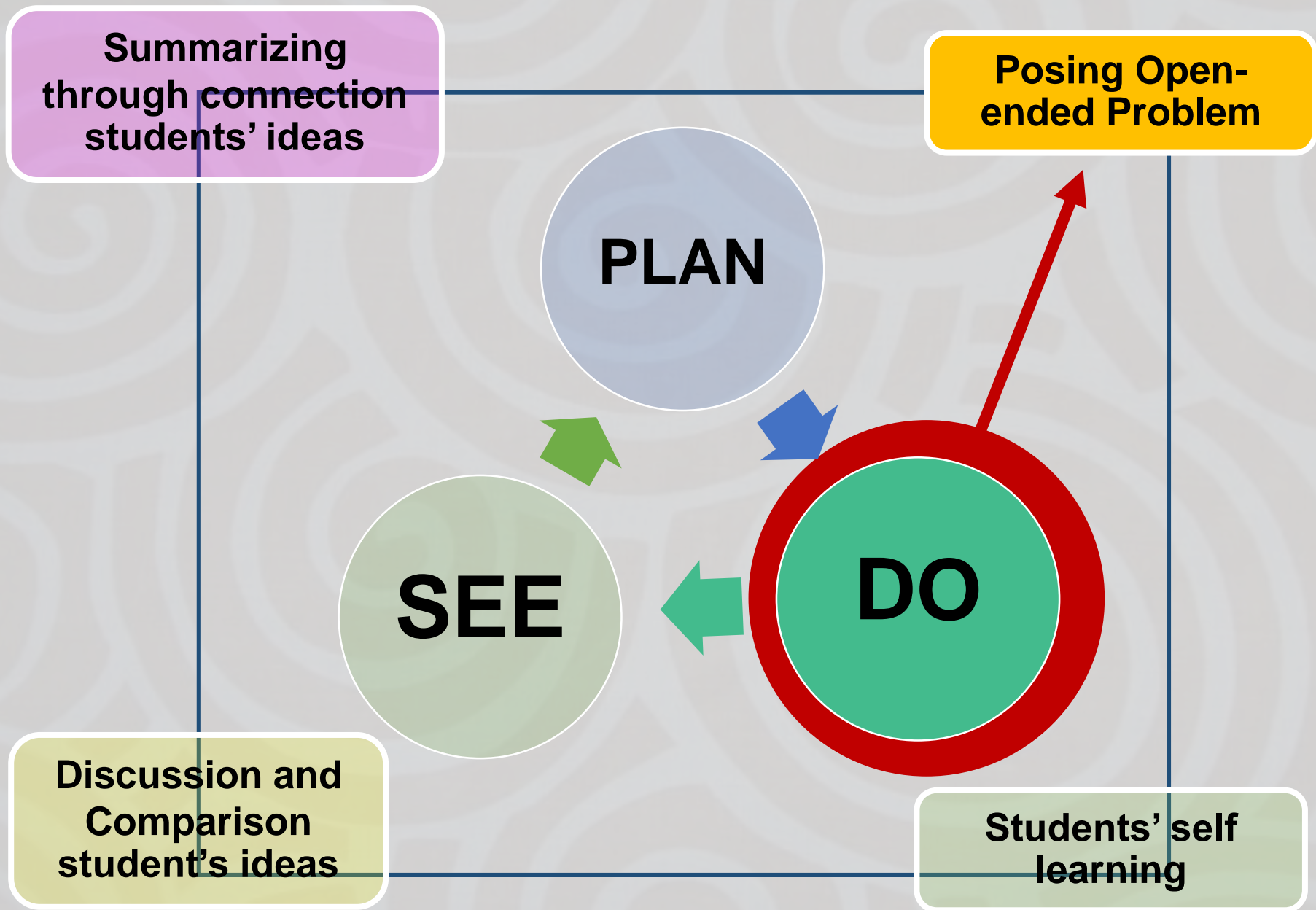




# ***Plan*** & Summarizing through connection students' ideas

- 1) **Organizing all ideas** occurred in a class
- 2) **Adding students' ideas representation** by using any representation such diagrams, figures, for connecting with desirable concept
- 3) Trying to enhance values in method in which is **'how to'**
- 4) **Emphasizing on letting students make some notes** of their own ideas, friends' ideas, and what is impressed and learned



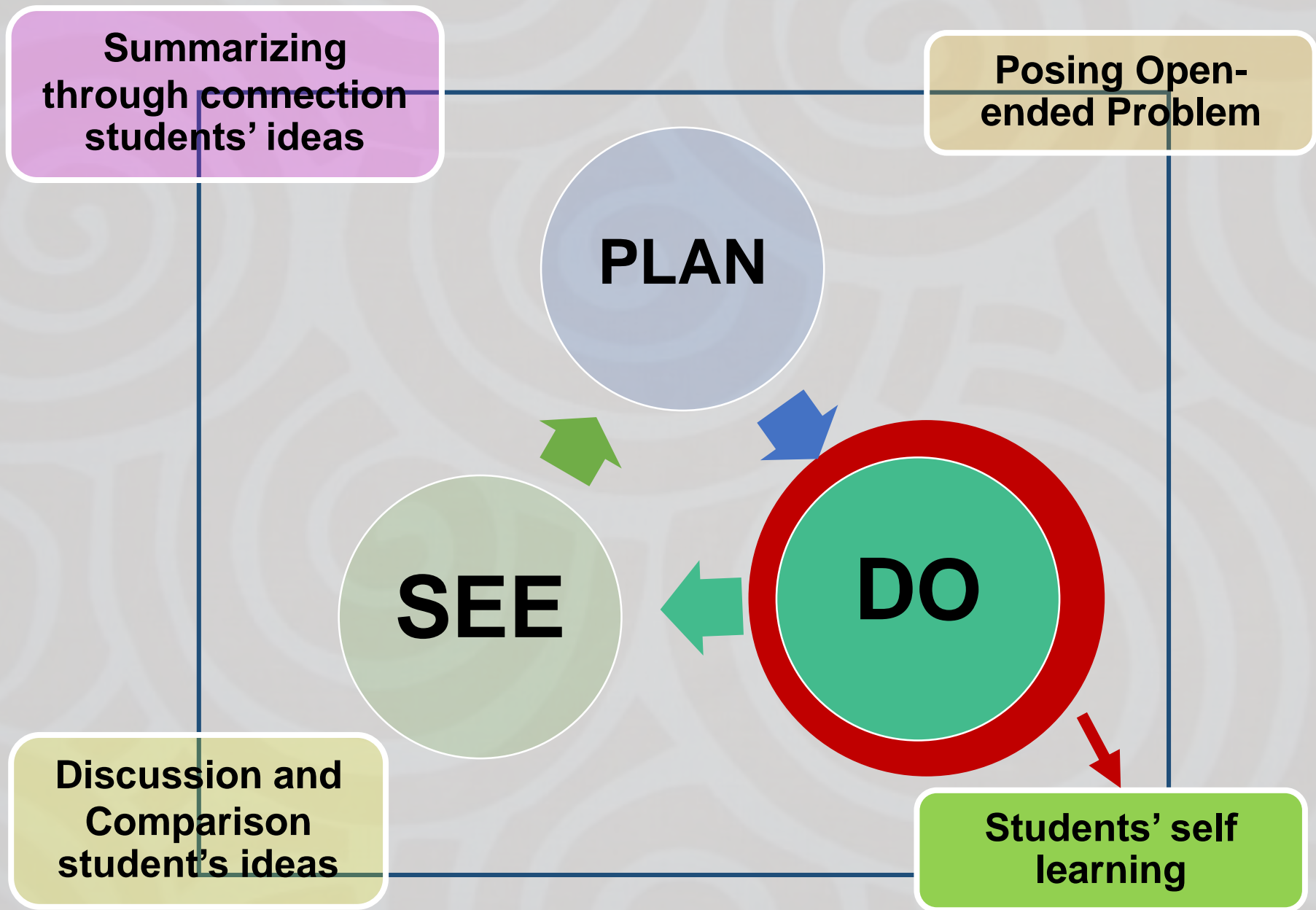


# **DO** & Posing Open-ended Problem

1) Note that **task will be students' problematic** or not?

**Difficult things is whether task would be students' problematic**

How supervisors' experience will help teachers?





# **DO** & Students' self Learning

2) What are students' ideas generate?

Do the ideas be the **same** or **different** is anticipated in a lesson design?

3) What are **students' difficulties**?

4) What do teachers **handle students' ideas**?



**Summarizing  
through connection  
students' ideas**

**Posing Open-  
ended Problem**

**PLAN**

**SEE**

**DO**

**Discussion and  
Comparison  
student's ideas**

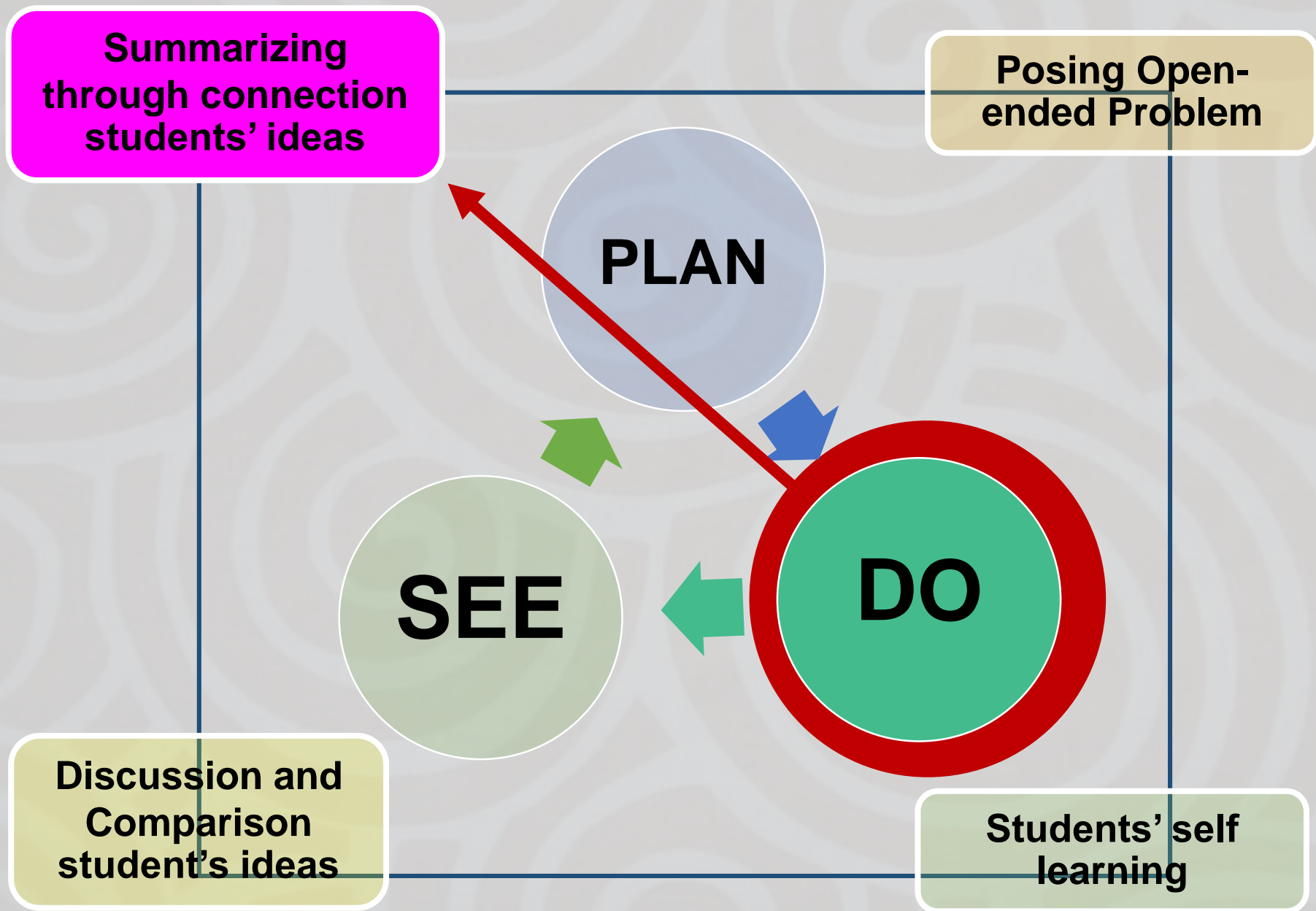
**Students' self  
learning**



# **DO** & Discussion and Comparison

- 1) Sequence of students' ideas
- 2) How do **teachers handle students' misunderstood ideas?**
- 3) How do teachers use **additional materials to extend students' ideas?**

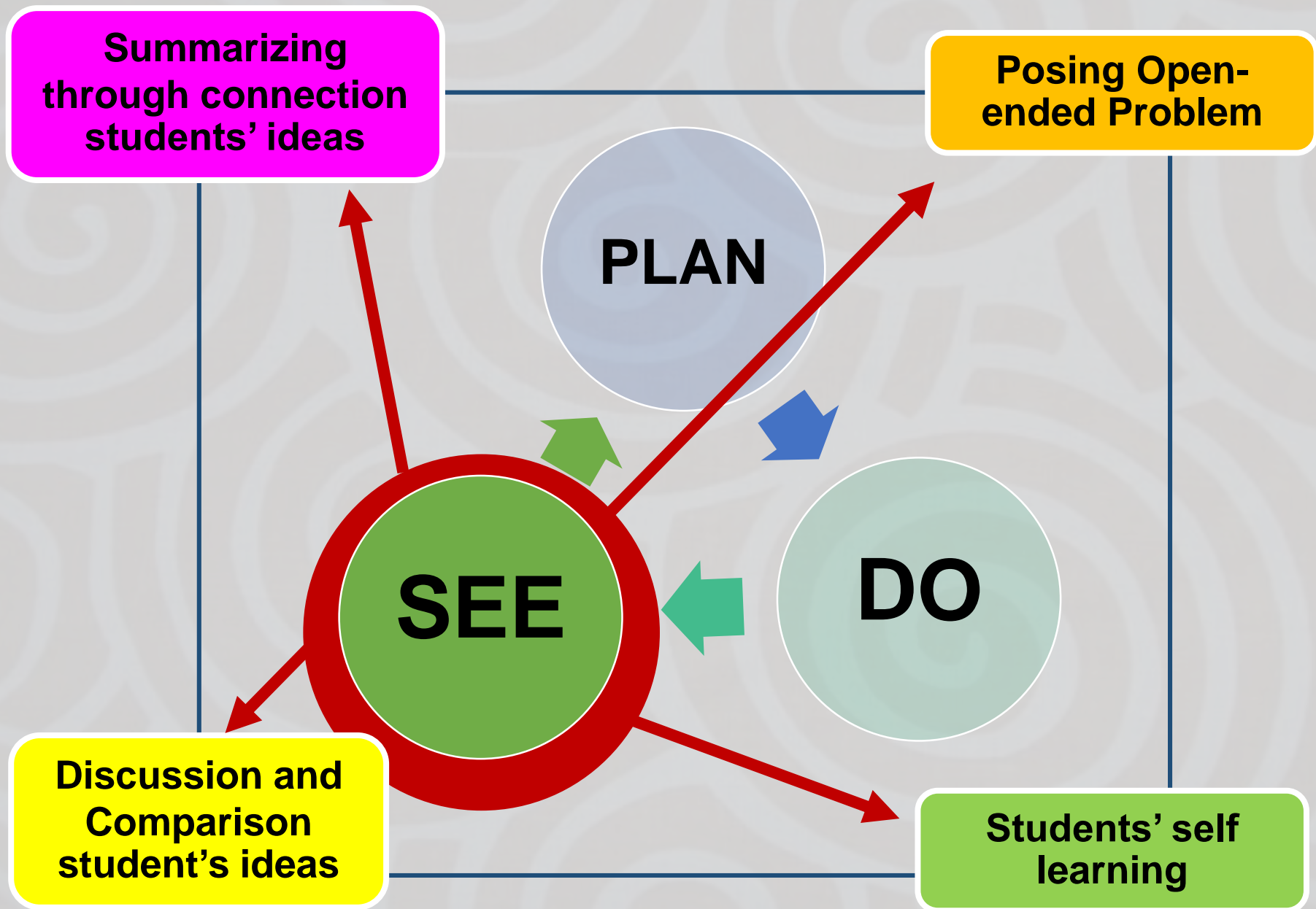




# **DO** & Summarizing through connection students' ideas

- 1) **Organizing all ideas** occurred in a class
- 2) **Extending students' ideas with any representations** such as diagrams, figures, for desirable ideas
- 3) Trying to enhance values of students' methods in which is **'how to'**
- 4) Emphasizing on letting students make some **notes** of their own ideas, friends' ideas, and what is impressed and learned







# SEE

- 1) How to collect data?
- 2) How to analyze mathematical subject matters?
- 3) What are results occurring with students?  
What are causes of the students' results?
- 4) What are difference occurred with students  
besides what is anticipated? What are causes of  
the differences?

# Collaboratively design research lesson (Plan)





# Collaboratively observing the research lesson (Do)



School Principal

Supervisor

Supervisor



# Collaboratively reflection in teaching practice (See)





# Teacher changes influence other new schools

ภาพจากชั้นเรียนในโรงเรียนในโครงการพัฒนาการคิดขั้นสูงทางคณิตศาสตร์  
ของนักเรียนในเขตพื้นที่ภาคตะวันออกเฉียงเหนือ







5 we 55

[illegible]

2nd month = 1st

(α-ω-διστά μαζομαχία)

“As Chairman Dean, Faculty of Education (all 16 institutions), we went to visit and to observe mathematics classroom for Grade 1 and Grade 5. We are admired and impressive this innovation for learning and research.

Hopefully, there will be development and spread of innovation. Will be adapted across Thailand in the future.”

Handwritten text in Thai script on lined paper, likely a note or draft. The text is written in blue ink and appears to be a personal or professional communication. It includes several lines of text, some of which are crossed out or corrected. The handwriting is cursive and somewhat informal.

**Prof. Dr. Somwung Pitiyanuwat,**  
a director of national assessment  
center

“I have been glad, proud and impressive with teaching development of Kookham Pittayasan School. It is very obvious that such teaching approach has developed students’ thinking and desirable characteristics by emphasizing on students. I would like to encourage all of you and I believe that it will be successful. Teachers and teacher professional development have to suitably been inside a new school context that would develop graduate in the new era.”

# Students Changes



ภาพจากชั้นเรียนในการประชุมนานาชาติ EARCOME 6 วันที่ 18 มีนาคม 2556

ผู้สอน: คุณครูพิสมัย แจ่มสง่า โรงเรียนบ้านบึงกาฬ จ.บึงกาฬ,  
นักเรียน ชั้นประถมศึกษาปีที่ 1 โรงเรียนบ้านท่าเรือ จ.ภูเก็ต





# Students' self learning







# Students' self learning







# Students' self learning





# Students' worksheet



- 1 มีเด็ก 9 คน เล่นในกระบะทราย และมีเด็ก 4 คนกำลังเล่นกระดานเลื้อน  
มีเด็กทั้งหมดกี่คน



หน้าเรียนมีวิธีคิดอย่างไรได้บ้างเกี่ยวกับสถานการณ์นี้บ่อยๆ

9เอาออกจิ้งเหลน1 4เอาออก2จิ้งเหลน  
2นำรวม2ก็ได้10 นำรวม2ก็ได้3 นำรวม  
กับ3ก็ได้13

9+4=13  
1 3  
10 3  
13

9ไปขอ4มาก็จะได้เต็ม10 ส่วน4จิ้งเหลน3 นำรวมกับ3  
ก็ได้13

9+4=13  
1 3  
10 3  
13

9เอาออก7จิ้งเหลน2 4เอาออก3จิ้ง  
เหลน1 นำรวม3ก็ได้10 นำรวม1  
ก็ได้13 นำ10รวมกับ3ก็ได้13

9+4=13  
3 6  
3 10  
13

9+4=13 4ไปขอ7มาก็จะได้เต็ม10 ส่วน  
9จิ้งเหลน3 นำ10รวมกับ3ก็ได้13

ต่อม อู่ม ทักษิณ เจน



นักเรียนมีวิธีการคิดอย่างไรเกี่ยวกับ  
ในกระป๋องทราย

$$7 + 5 - 8 = 4$$

3 2

10 2

12 - 8 = 4

10 - 8 = 2

$$7 + 5 - 8 = 4$$

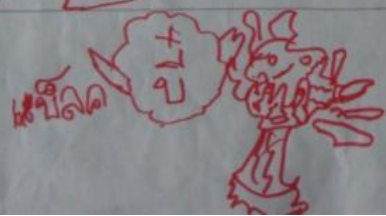
2 5

2 10 -

12 - 8 = 2

10 - 8 = 2

กลุ่ม 2



$$7 + 5 - 8 = 4$$

3 2

10 2

12 - 8

2 10 - 8 = 2

4

7 + 5 - 8

2 5

2 10

12 - 8 =

10 - 8 = 2

วิธีคิดที่ง่าย

- นักเรียนมีวิธีการคิดอย่างไรเกี่ยวกับในกระป๋องทราย  
- นักเรียนมีวิธีการคิดอย่างไรเกี่ยวกับในกระป๋องทราย  
- นักเรียนมีวิธีการคิดอย่างไรเกี่ยวกับในกระป๋องทราย

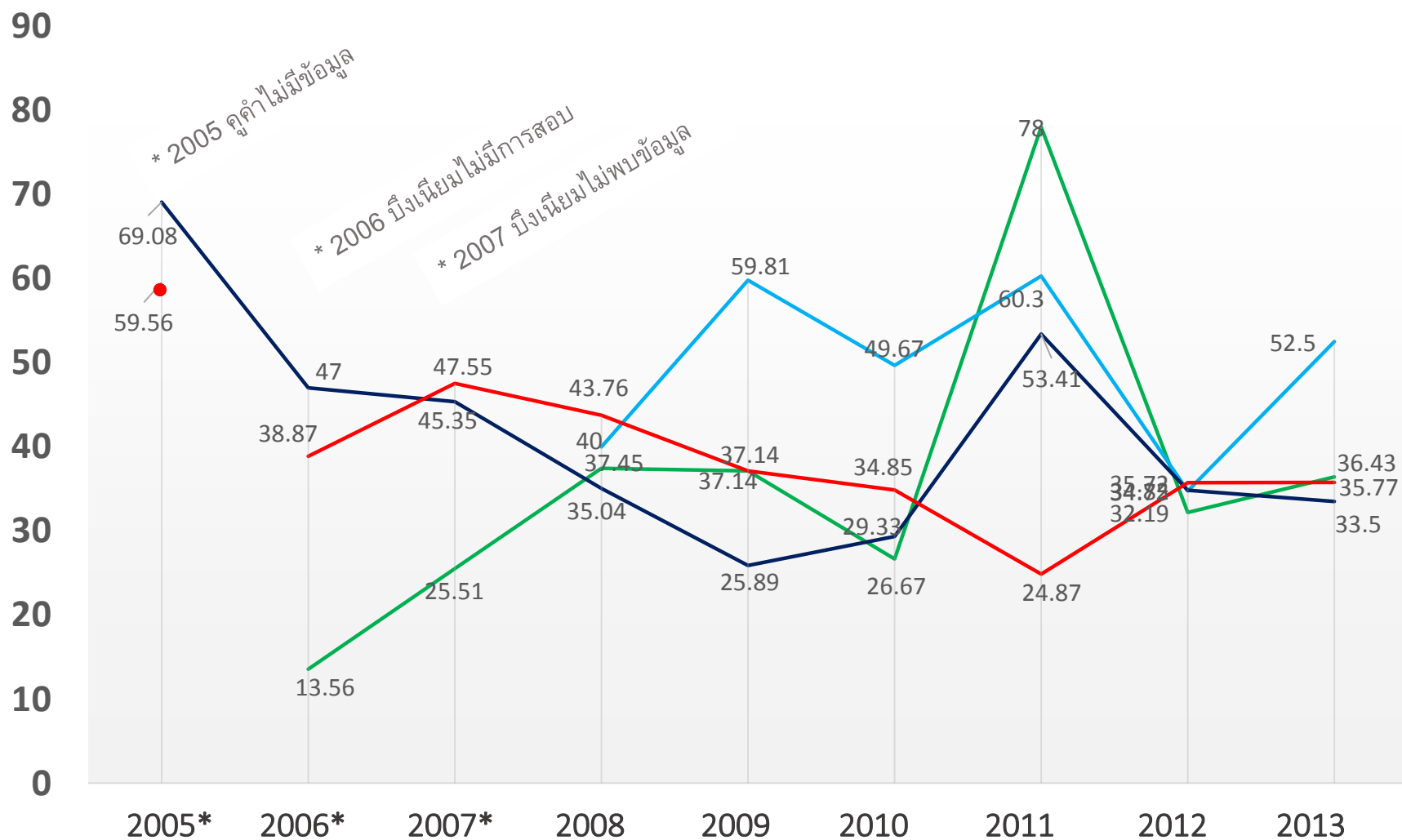
มีเด็กเล่นกระป๋องทราย  
7 ไปขอ 5 มา 5 ก็จะเต็ม 10  
เต็ม 10 แล้วลบ 5 ก็จะเหลือ 2  
นำ 10 รวม 2 ก็ได้ 12  
2 เอาออก 8 ไม่ได้ แต่  
10 เอาออก 8 ได้ จึงได้ 2  
นำ 2 รวม 2 ก็ตอบ 4  
5 ไปขอ 7 มา 5 ก็จะเต็ม 10  
7 ให้ 5 ไป 5 เลย เหลือ 2 นำ  
10 รวม 2 ก็ตอบ 12  
2 มันยังไม่ได้ออกที่พอที่จะ  
ออก 8 ได้ แต่ถ้ามันได้ออกที่พอที่จะ  
เอาออก 8 ได้ จึงเหลือ 2 นำที่ไม่  
ได้ออก มารวมกับ 10 ที่ได้ออก  
ได้ 4



# **Students' achievement in Mathematics of Students in Project Schools by O-NET (Ordinary National Education Test) scores**



# O-NET (Ordinary National Education Test) Score in Mathematics of Students in Project Schools



Kookam Pittayasan School

Chumchonban chonnabot school

Banbungneumbungkainoon School

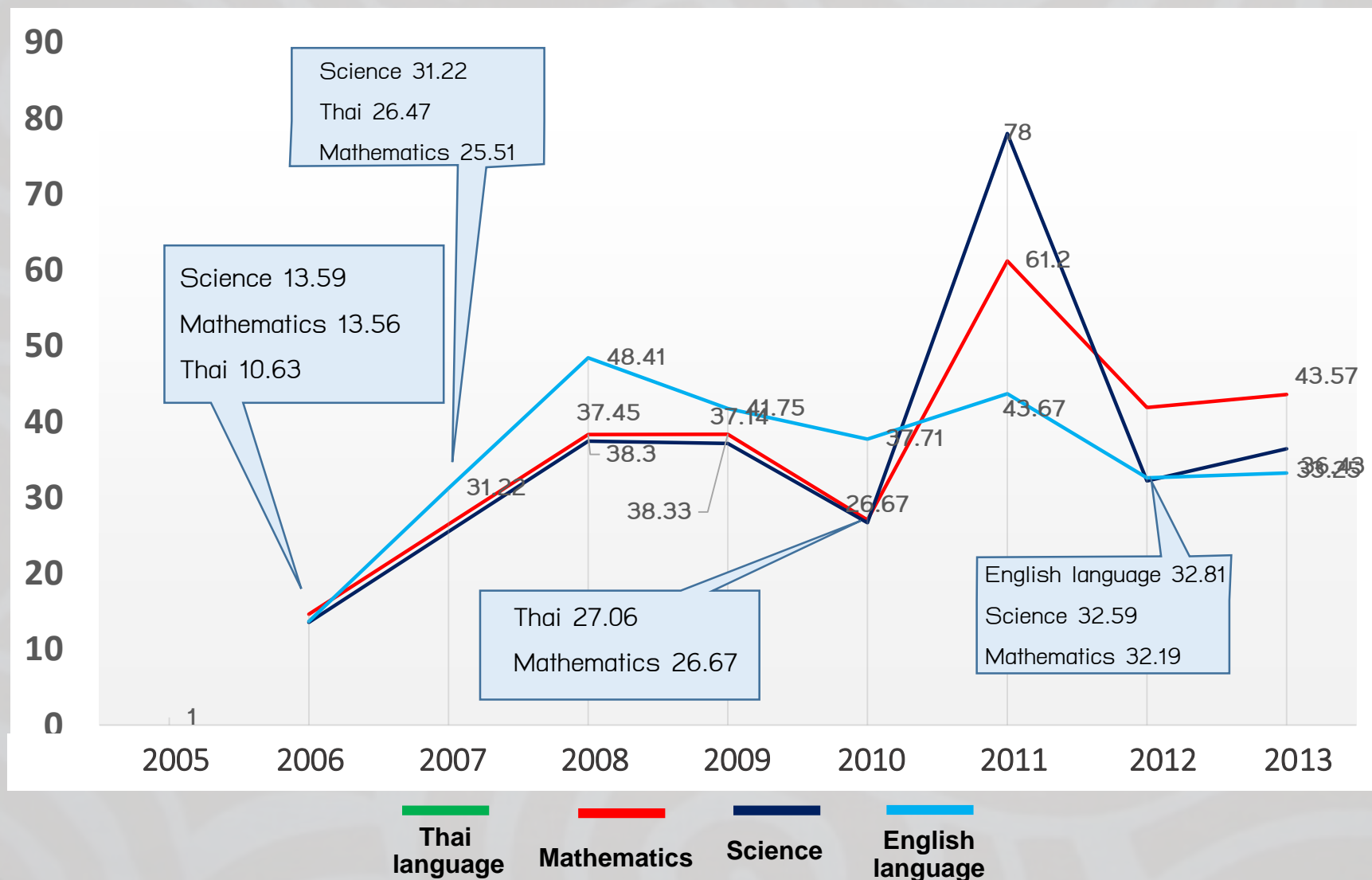
Mean





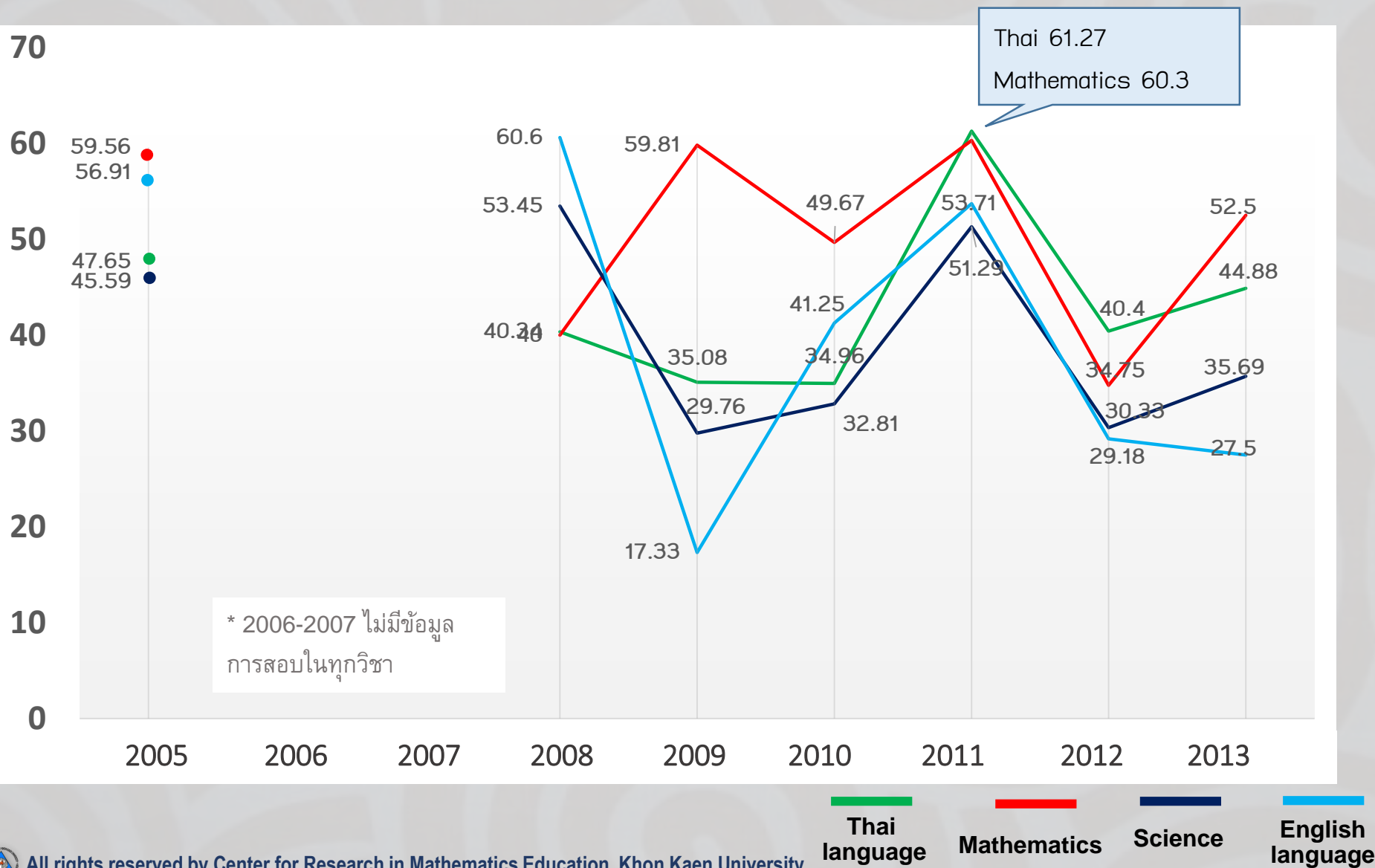
# O-NET Score in other Subjects of Students in Project Schools

## *Kookam Pittayasan School*



# O-NET Score in other Subjects of Students in Project Schools

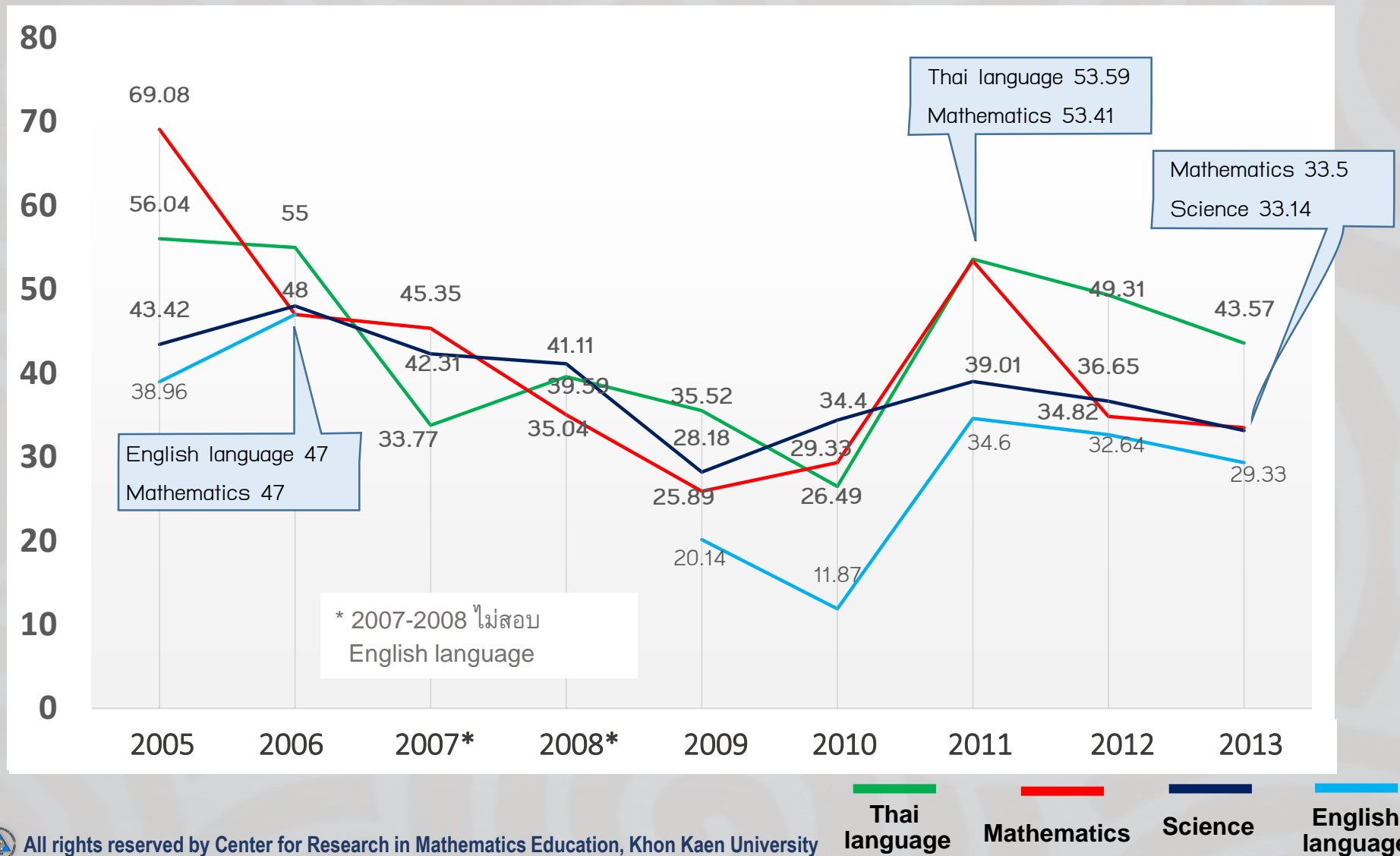
## *Banbungneumbungkainoon School*





# O-NET Score in other Subjects of Students in Project Schools

## *Chumchonban chonnabot school*





World Association of Lesson Studies International Conference 2015  
Lesson Study for Improvement of Classroom Quality  
November 23-26, 2015 Khon Kaen University, Thailand



## IMPORTANT DATES

First call for papers	: 15 December 2014
Second call for papers	: 31 March 2015
Deadline for abstract submission	: 1 May 2015
Notification for acceptance	: 1 July 2015
Deadline for early bird registration	: 31 August 2015
Deadline for regular registration	: 30 September 2015



Website: [www.ednet.kku.ac.th/~wals2015/](http://www.ednet.kku.ac.th/~wals2015/)

Where: Khon Kaen University, Thailand

When: 23-26 November 2015