Does reflection improve teaching? A case study of pre-service teachers' lesson design in lesson study

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Background

Developing pre-service teachers' Pedagogical Content Knowledge (PCK) through lesson study

Lesson Study Cycles

Productive reflection: integrating multiple aspects of teaching.

Reflection on learning : Planning and looking back on the teaching
Reflection in learning : in-the moment decision making

Reflection is both individual and group collaboration

Reflection

Depth of Reflection :

Descriptive : Problem-setting stage
Comparative: making sense of the problem through different perspectives
Critical: evaluate different approaches to begin to formulate alternative ways of teaching

(Jay and Johnson 2002)

Methods used to study reflection

- Reflective journals (Davis, 2006; Myers, 2012)
- Portfolio (Chamoso, Cáceres, Azcárate, 2012)
- Observation of group discussion (Turner, 2008; Ricks, 2011)

Pre-service teachers' Reflection

- Descriptive reflection, focusing more on the teaching particularly on themselves as the teacher, rather than the learning (Davis, 2006; Myers, 2012)

- Reflection needs probing and prompting (Mewborn, 1999)

Research Questions

- What stages of reflection is performed by the pre-service teachers during lesson study?
- What changes in the pre-service teachers' teaching after conducting reflection in lesson study?

Methodology

- **Research methodology** : Case study
- **Participants:** 5 pre-service teachers, 2 mentor teachers, 2 lecturers, 1 knowledgeable other
- **Data collection** : video and individual interviews
- **Data Analysis** : videos and interviews were transcribed and coded using stages of reflection framework

Methodology - Research Context

Teaching Practicum

- usually offered to third-year pre-service teachers who have pass compulsory subjects on mathematics and pedagogy
- in this study, the pre-service teachers have not had any teaching experience

Lesson Study

- The lesson study was implemented in a teaching practicum program at one lower secondary school
- The pre-service teachers, mentor teacher and university lecturer formed a lesson study group (LSG), the researcher acted as the knowledgeable other.
- The LSG conducted two cycle of lesson study. Each consist of one planning, three research lessons, and three post lesson discussions

Methodology – Research Design

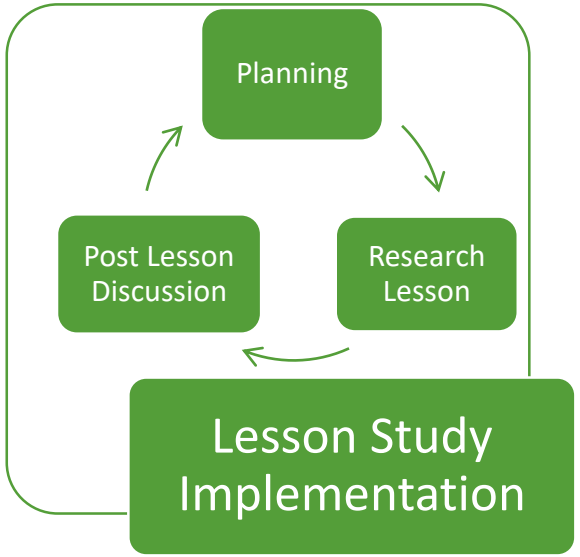
Lesson study was implemented in a 4-month teaching practicum program.

Mentor teachers, pre-service teachers and university lecturers attended 3 hour workshop on Lesson study

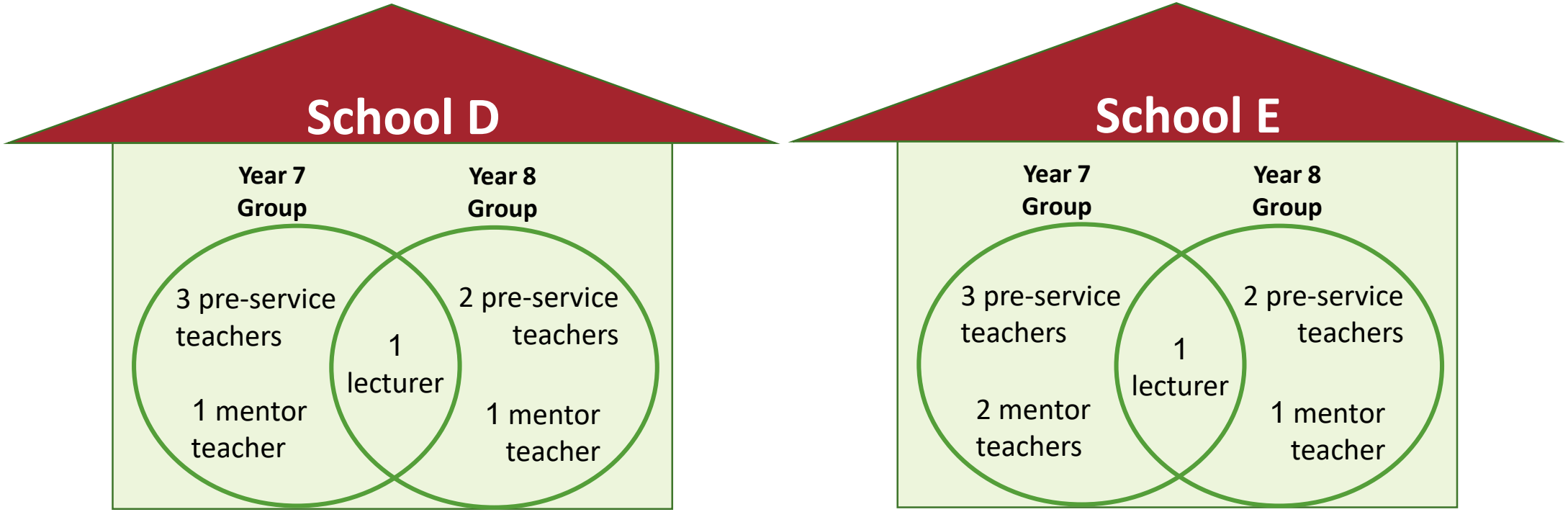
Lesson Study Workshop

Observation and Preparation

Pre-service teachers observed mentor teachers' lesson



Lesson Study Groups



Findings : Case 1 (C1E8)

The Lesson : Gradient of a line

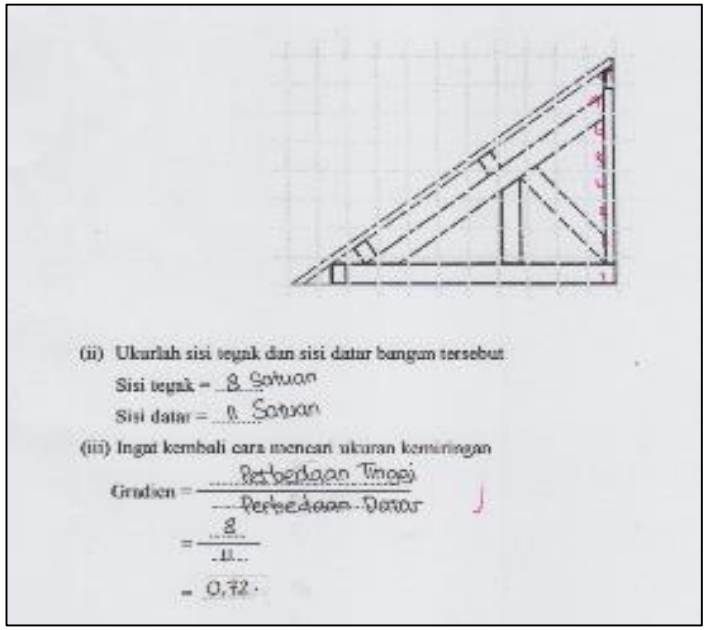
Using Cartesian Plane to help students understand the concept of gradient = $\frac{rise}{run}$

$$m = \frac{y}{x}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Findings : Case 1 (C1E8)

Research Lesson 1



(ii) Ukurlah sisi tegak dan sisi datar bangun tersebut

Sisi tegak = 8 Satuan

Sisi datar = 11 Satuan

(iii) Ingat kembali cara mencari ukuran kemiringan

$$\text{Gradien} = \frac{\text{Perbedaan Tinggi}}{\text{Perbedaan Datar}}$$

$$= \frac{8}{11}$$

$$= 0,72$$

Findings : Case 1 (C1E8)

The post lesson discussion - Descriptive Reflection

Vina : I thought students would have understood the Cartesian plane, the positive and the negative area of the plane. But they did not understand that, thus they only counted the grids and ignored the value.

Meili : We did not predict they would misunderstand that gradient is always positive. But that is understandable because the examples you gave in the introduction lead them to think that way. The goal of the second worksheet is to clarify the positive and negative gradient, then maybe you need to re-think the coordinates. For example, mirroring, (2, 4) and (2, – 4) then can be seen in the graph the lines are different, but if they only count the grids, they would end up with the same result – positive gradient. You might want to reconsider this, will this be easier for students?

DR
Problem statement

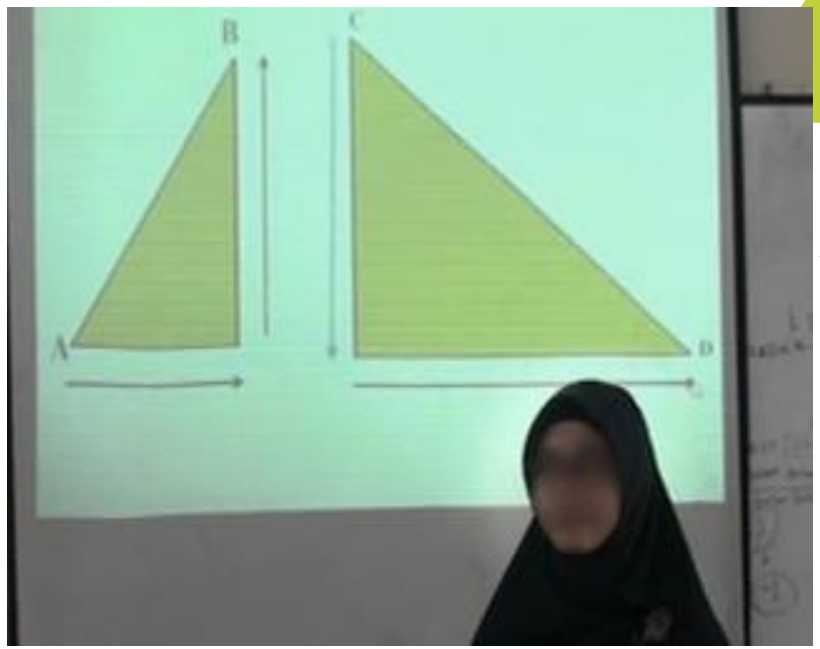
CrR
Alternative

CoR
Making sense of the problem

Findings : Case 1 (C1E8)

Research Lesson 2

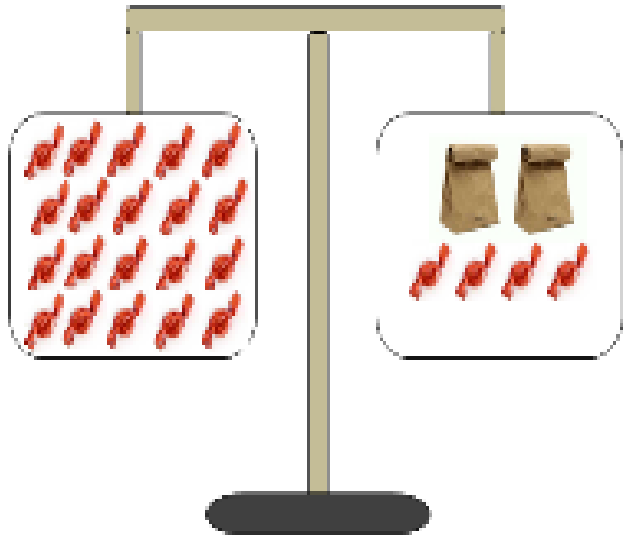
Yanti	:	To measure a gradient, by determining the ratio of "height difference and horizontal difference". There is another thing you must consider when determining the gradient. There's a positive gradient and a negative gradient. Look at this picture again line AB and CD. We can see that this line can be seen two ways, from A to B it goes up, from B to A it goes down. Now we need to make a convention. We start from the left. So we go from A to B, or the run then the rise. Look at the run. From A it goes to the right and then goes up to B, thus it's positive. Now look at CD. What was our agreement?
Students	:	Start from the left
Yanti	:	The left side is C. We go from C to D. First we go down. What's the value then?
Students	:	Negative
Yanti	:	After that we go to the right. What does it mean?
Student	:	Positive



Findings : Case 2 (C1D7)

The Lesson : linear equations

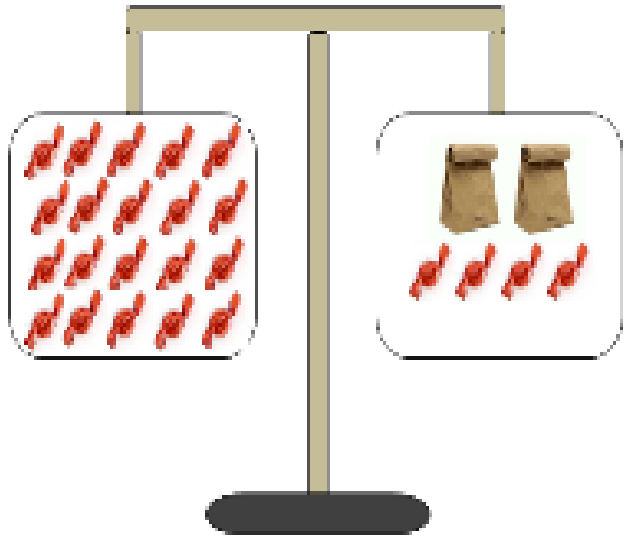
Using balance model to introduce the concept of equality, then move forward to solving the equation



Findings : Case 2 (C1D7)

Research Lesson 1

Students could find the number of candies in each bag, but not able to write the equation $20 = 2x + 4$



Findings : Case 2 (C1D7)

Post Lesson Discussion

Meili : I noticed Nuri stated $x = 2$ bags of candies. Rani wrote $x = 1$ bag, Rafi wrote $x =$ the number of candies in one bag. But then he wrote on the board, $x =$ bag. Many students had misconception of the meaning of x. You need to correct this in the next meeting. Some students did not use x. They wrote $(20 - 4) \div 2 = 8$. What do you think happens here? Why they can solve it using basic calculation, but they cannot write the equation?

Raya : I think, looking at the syllabus, first they learn about numbers, then sets, and then linear equation with one variable. They have not learned basic algebra for linear equation with one variable in algebra.

Ida : In the previous meeting on Thursday, I introduced them to equation, variable, constant, and coefficient. Only the terminologies. We have not covered the operations at all.

Nur : In the 2013 Curriculum, algebra topic is allocated for Year 8. While in the previous curriculum it was for Year 7. We teachers find it problematic with 2013 Curriculum because the topic is not in order; we need to allocate time for introducing the pre-knowledge.

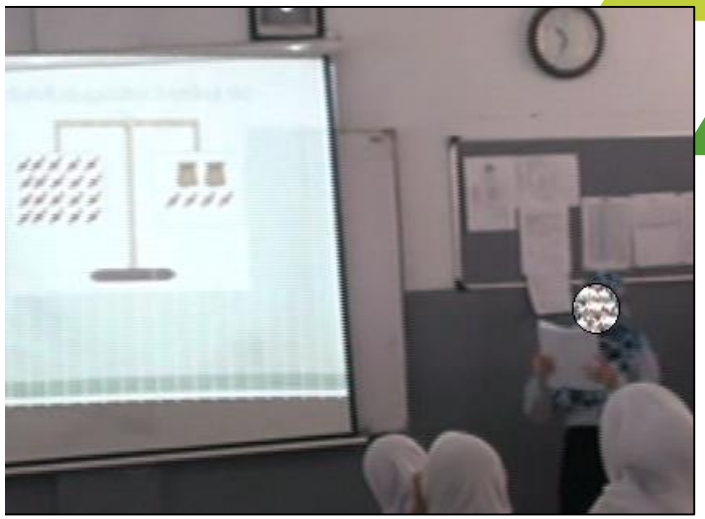
DR: Problem statement

CoR: Making sense of the problem

Findings : Case 2 (C1D7)

Research Lesson 2

Raya	:	Look at the whiteboard. What is that?
Students	:	Candies and bags.
Raya	:	What else?
Students	:	Balance weighs.
Raya	:	Look at the position of the balance. Are they equal or any side is heavier than the other?
Students	:	The same.
Raya	:	Look at the right side of the balance. What's in there?
Students		4 candies and 2 bags
Raya	:	What's in the left?
Students	:	…
Raya	:	So far do you understand? You will be asked to write the equation. Just like the previous example, $10 + 2s = 50$. This is called the equation. Now from the picture here, you are asked to change it into an equation.



Conclusion

- Post lesson discussion provides a structure for reflection, that is through critically discussing evidence of students' work
- The pre-service teachers' reflection stages:
    - Descriptive reflection
    - (Early) comparative reflection
    - (Early) critical reflection
- Reflection helped pre-service teachers identify the problems. But they need more support to do comparative and critical reflection
- The pre-service teachers would go back to the teaching method they are familiar with – traditional approach

Thank You