Professional Development through Lesson Planning : Revealing a critical process of Lesson Study

JUSTEC 26th

Tokyo Gakugei University

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IMPULS 国際算数数学授業研究プロジェクト
International Math-teacher Professionalization Using Lesson Study

Focusing on

①Lesson Study

②Mathematics Problem Solving Lesson

③ Lesson Plan and Task Design in Lesson Study

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International Math-teacher Professionalization Using Lesson Study

Lesson Study

- We are doing LS for about 120 years
- LS is a mechanism for self-improvement of teachers in schools
- Why we are doing LS..

教師は授業で勝負する

A lesson is the proving ground for teachers

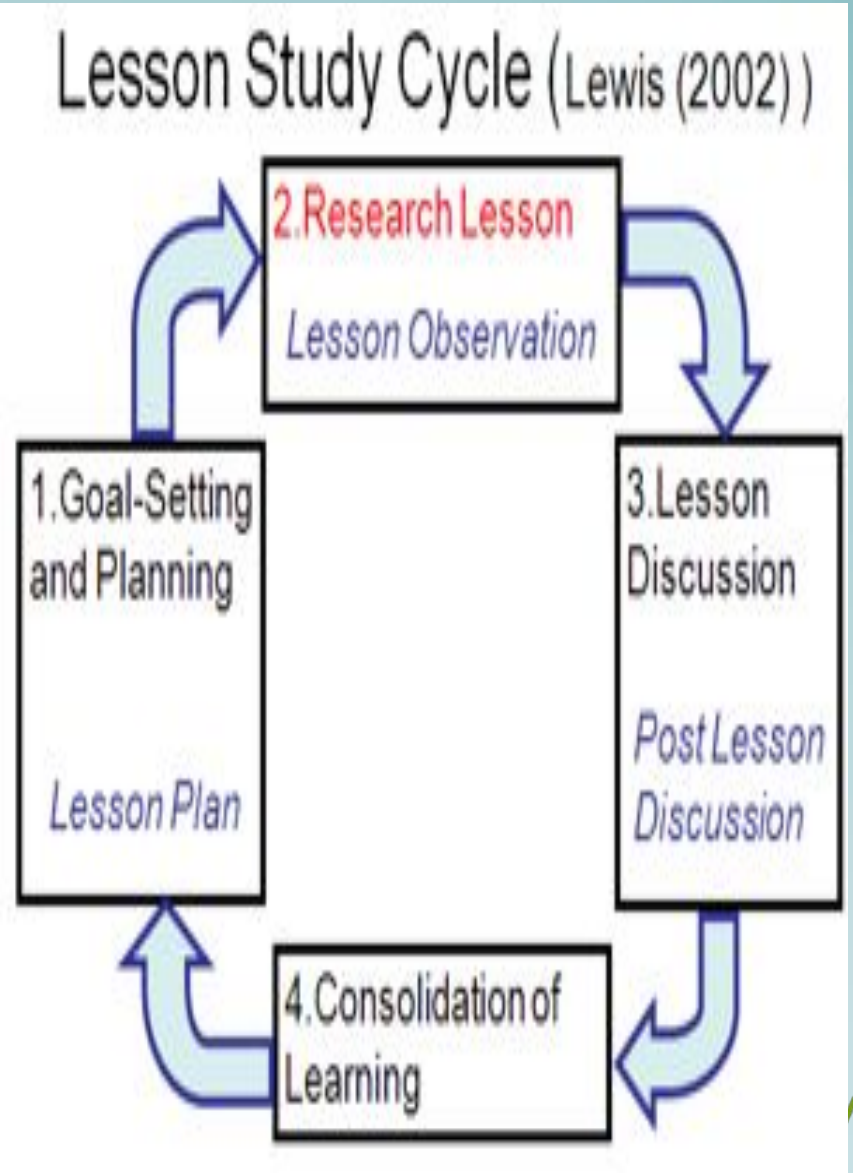
Lesson Study Cycle

Long term activities

Lesson Study Cycle

Planning : making a detailed lesson plan

Lesson Study Cycle



Lesson is "structured problem solving", or Problem solving lesson

Lesson Study Cycle

Post Lesson Dis.

Teaching:

Learning:

Task:

Mathematical,

Educational,

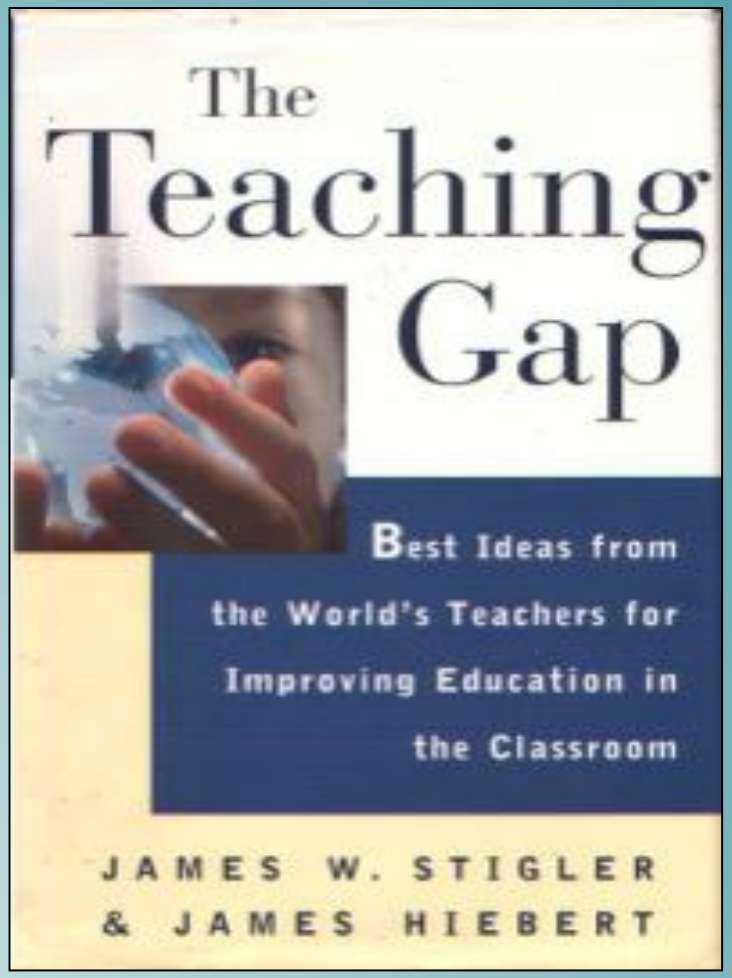
Values,

4.Consolidation of Learning
Research Report Booklet

Catherine Lewis and Inoko Tsuchida (1998)

A Lesson is Like a Swiftly Flowing River: Research Lessons and the Improvement of Japanese Education.

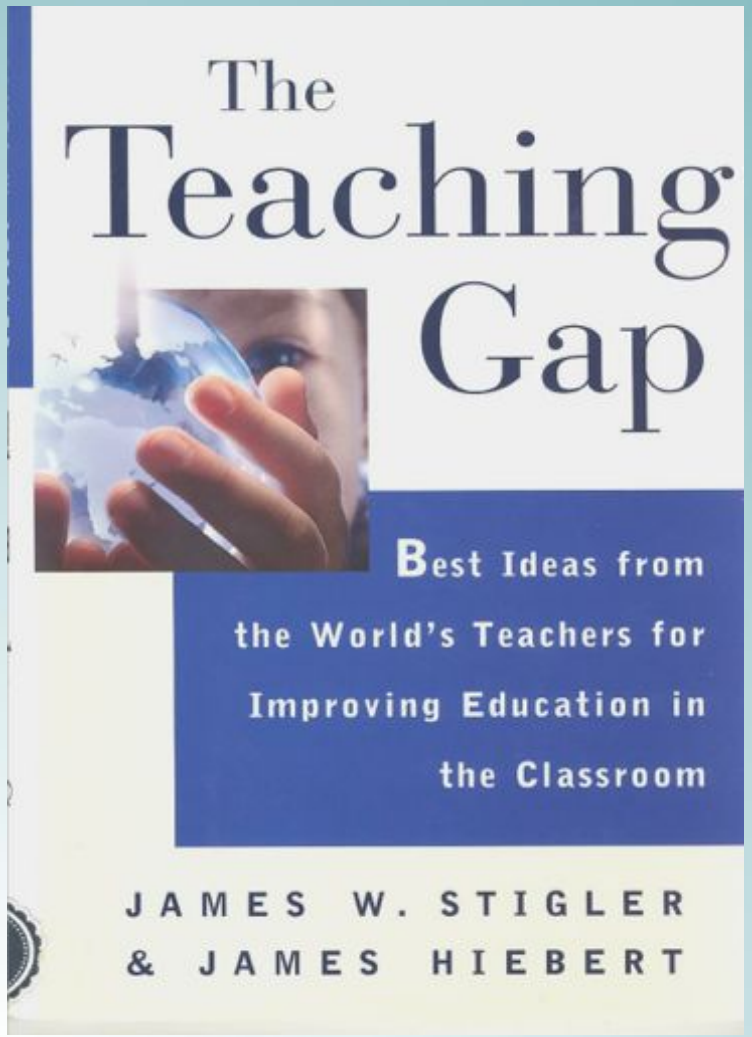
American Educator **(Winter): 14-17, 50-52**

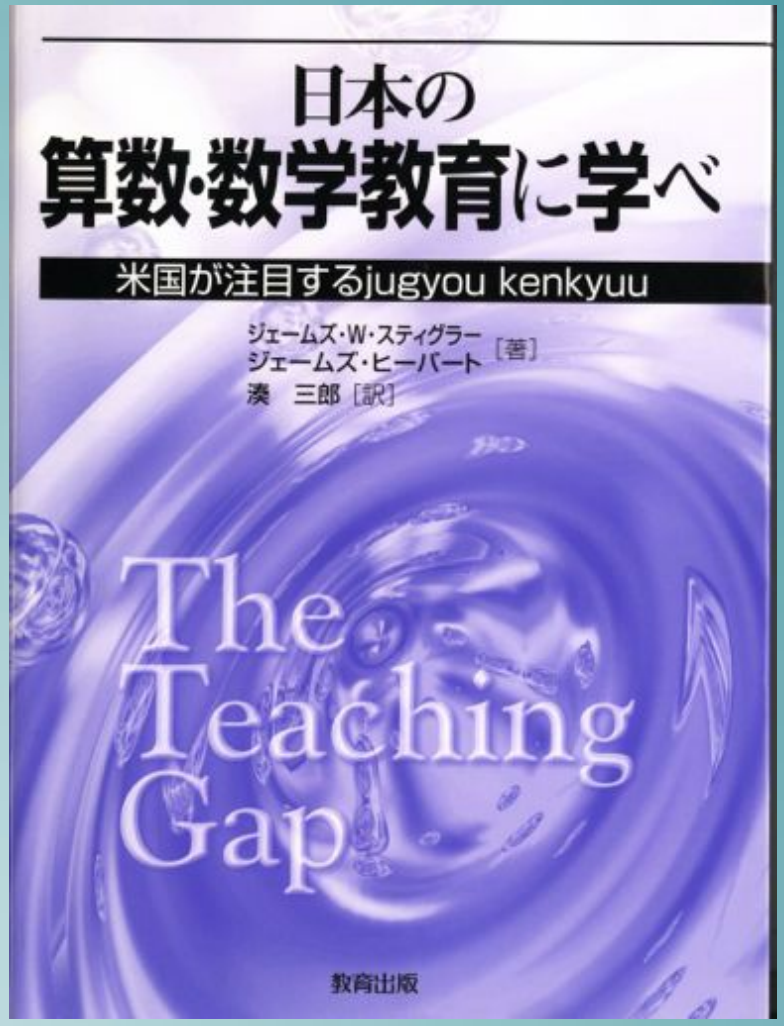


The Teaching Gap

Stigler & Hiebert (1999)

The Free Press





1999

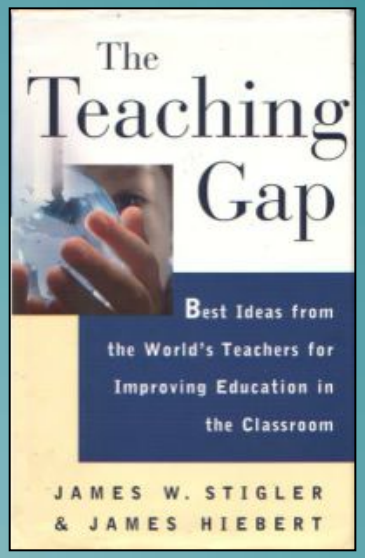
THE FREE PRESS

2002

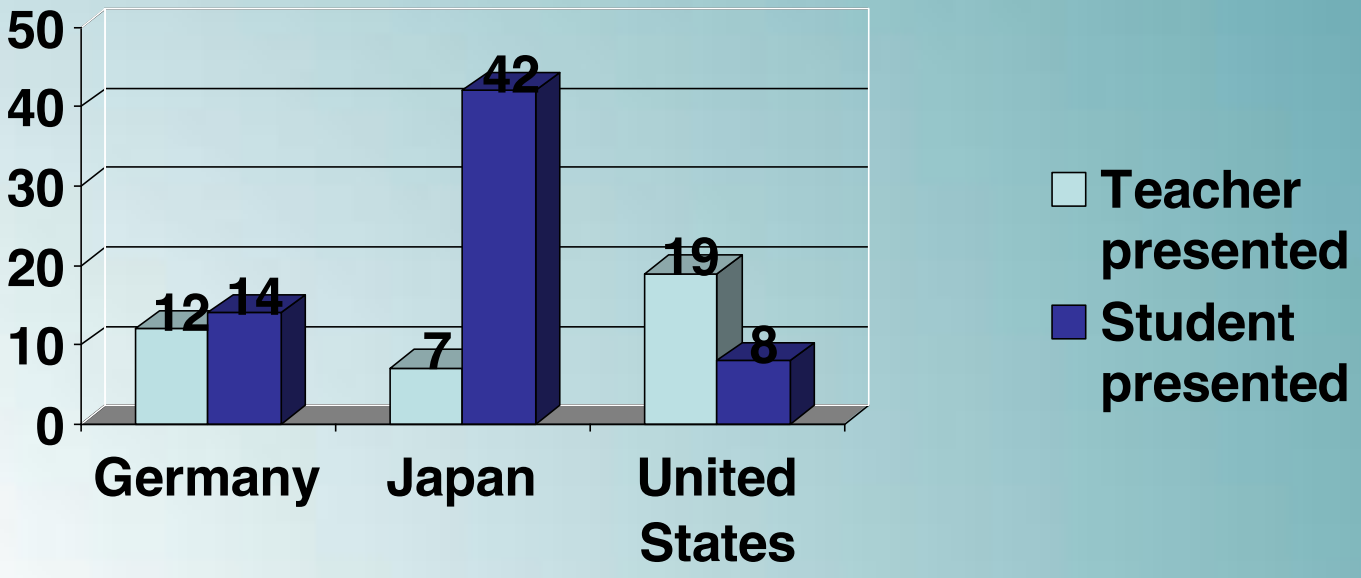
translate by
Prof.S.Minato

Study of Classroom Teaching

- TIMSS Video Study
  - Examine similarities and differences in the instructional methods that lay behind the students' achievement scores
  - 231 **eighth-grade mathematics lessons** are **videotaped**
    - 81 in the US
    - 100 in Germany
    - 50 in Japan



Student Presentation of Alternative Solution Methods

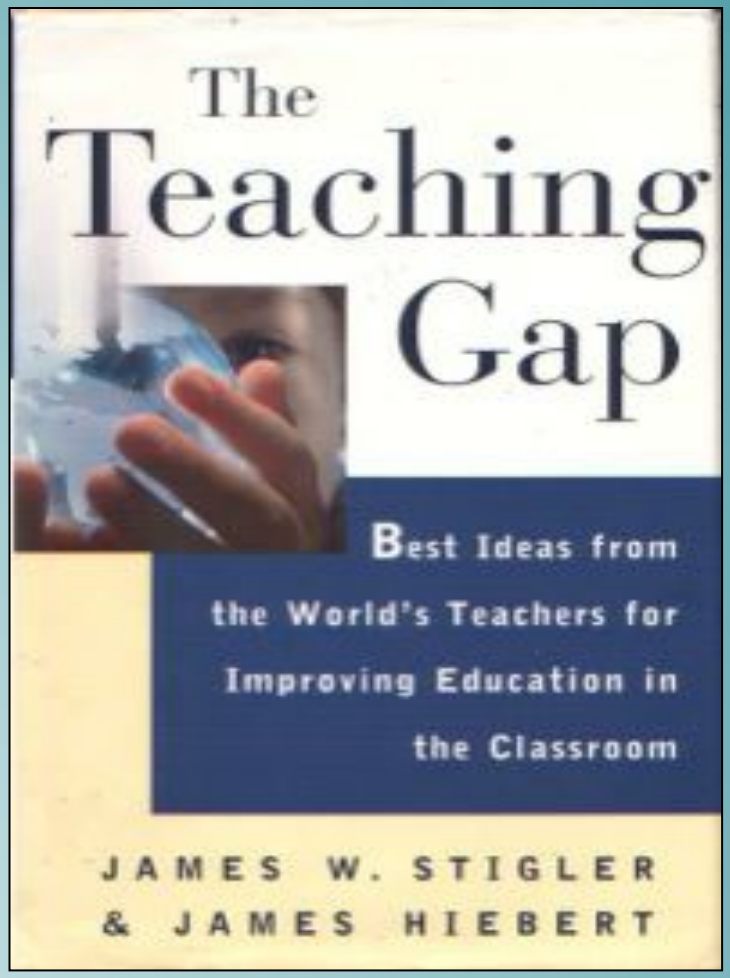


Percentage of lessons that included student-presented alternative solution methods

Chapter 1 to 6

Chapter 7
Beyond Reform:
Japan's Approach to the Improvement of Classroom Teaching

Hiroshima, Elementary School
Ethnographic Study on Lesson Study
Research Lesson: First Grade Mathematics, Subtraction with borrowing



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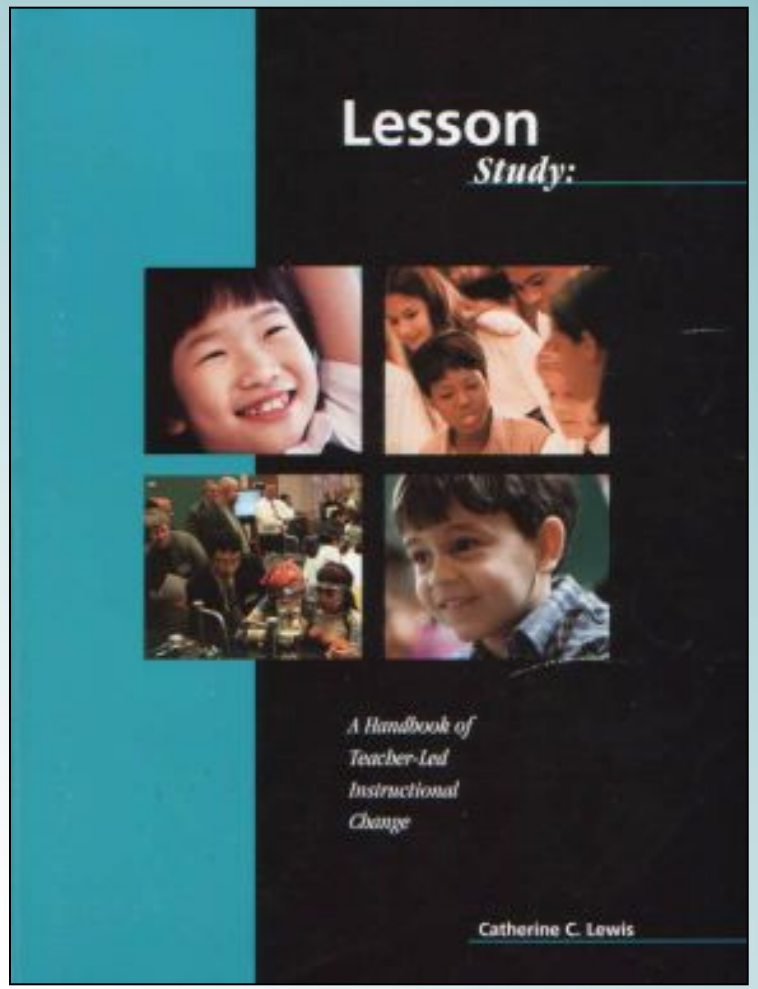


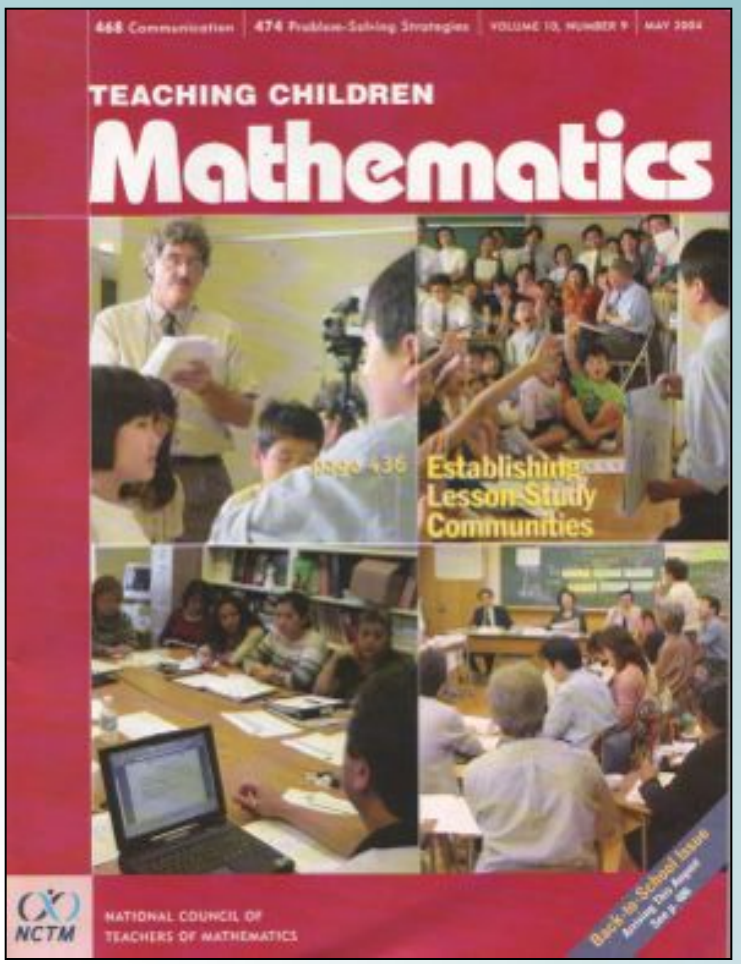
Lesson Study:

A Handbook of Teacher-Led Instructional Change

Lewis (2002)

Research for

Better Schools (RBS)

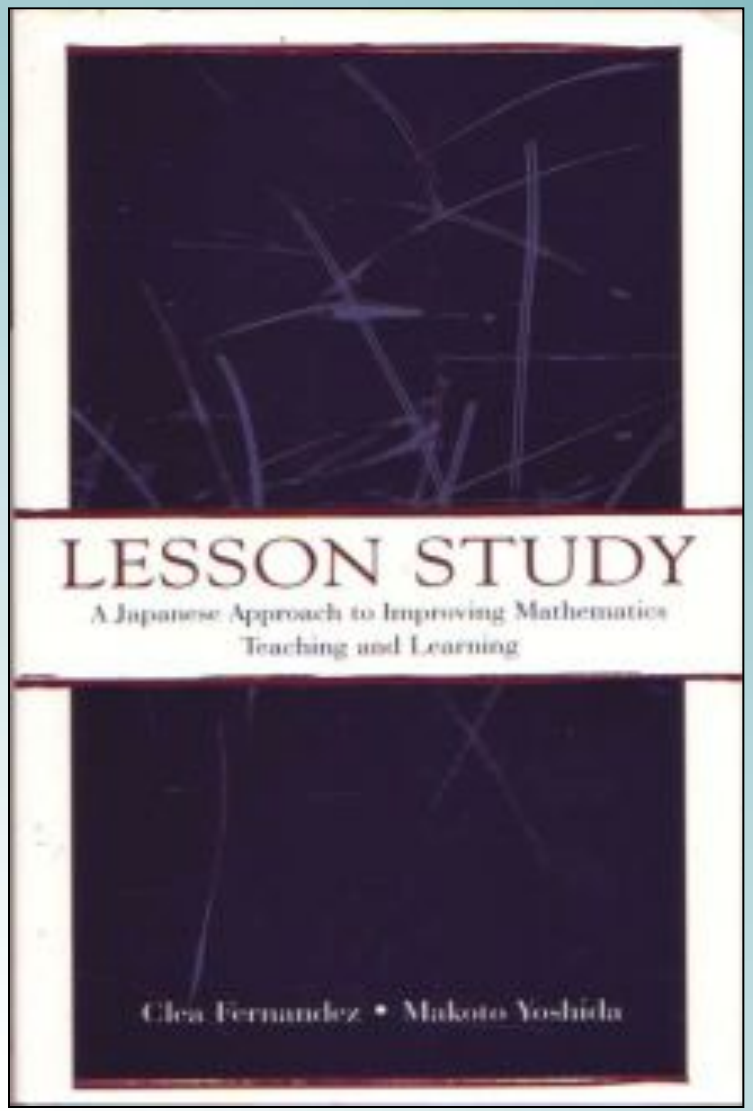


"Ideas for Establishing Lesson Study Communities"

Takahashi & Yoshida

Teaching Children Mathematics (2004)

National Council of Teachers of Mathematics (NCTM)

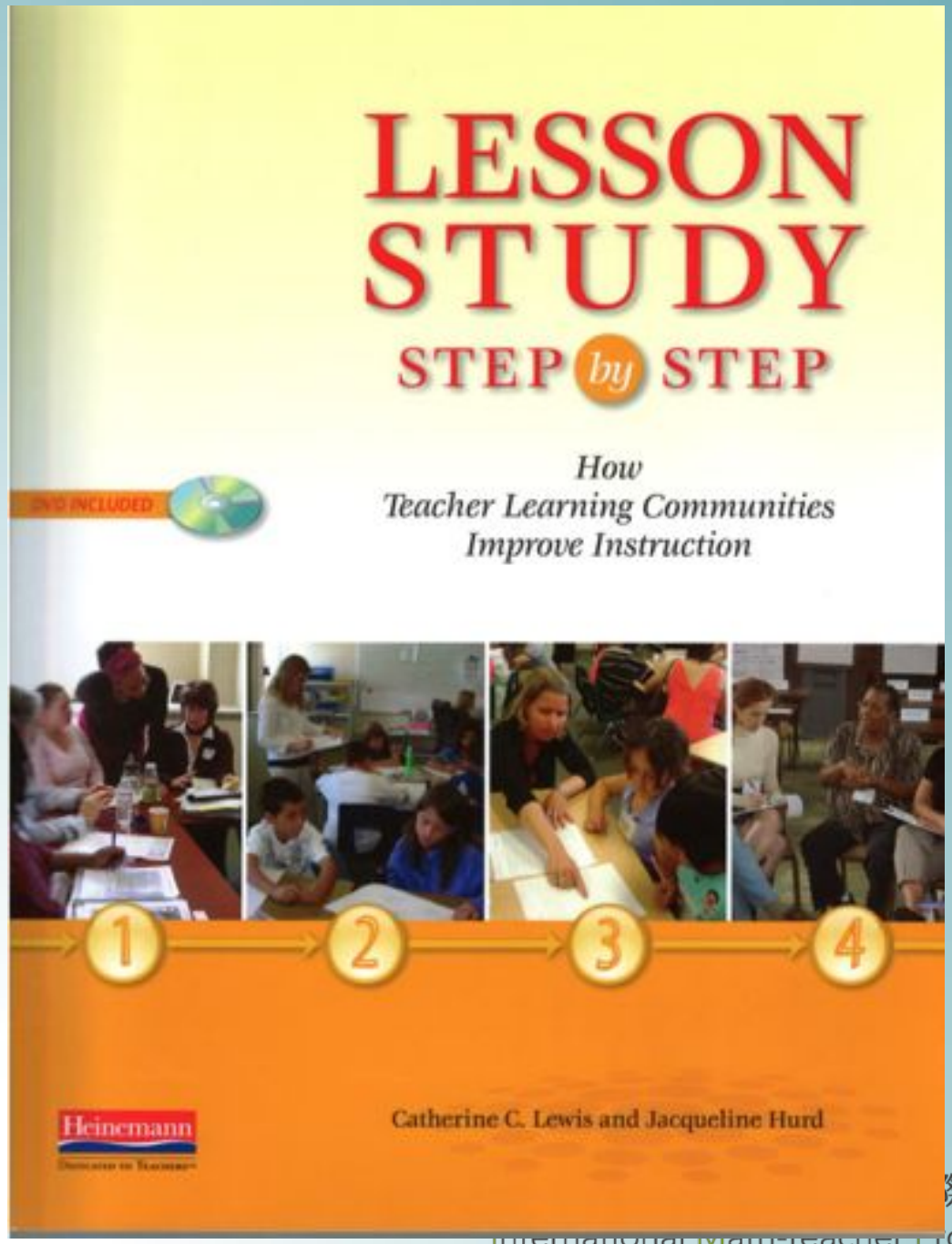


Lesson Study:

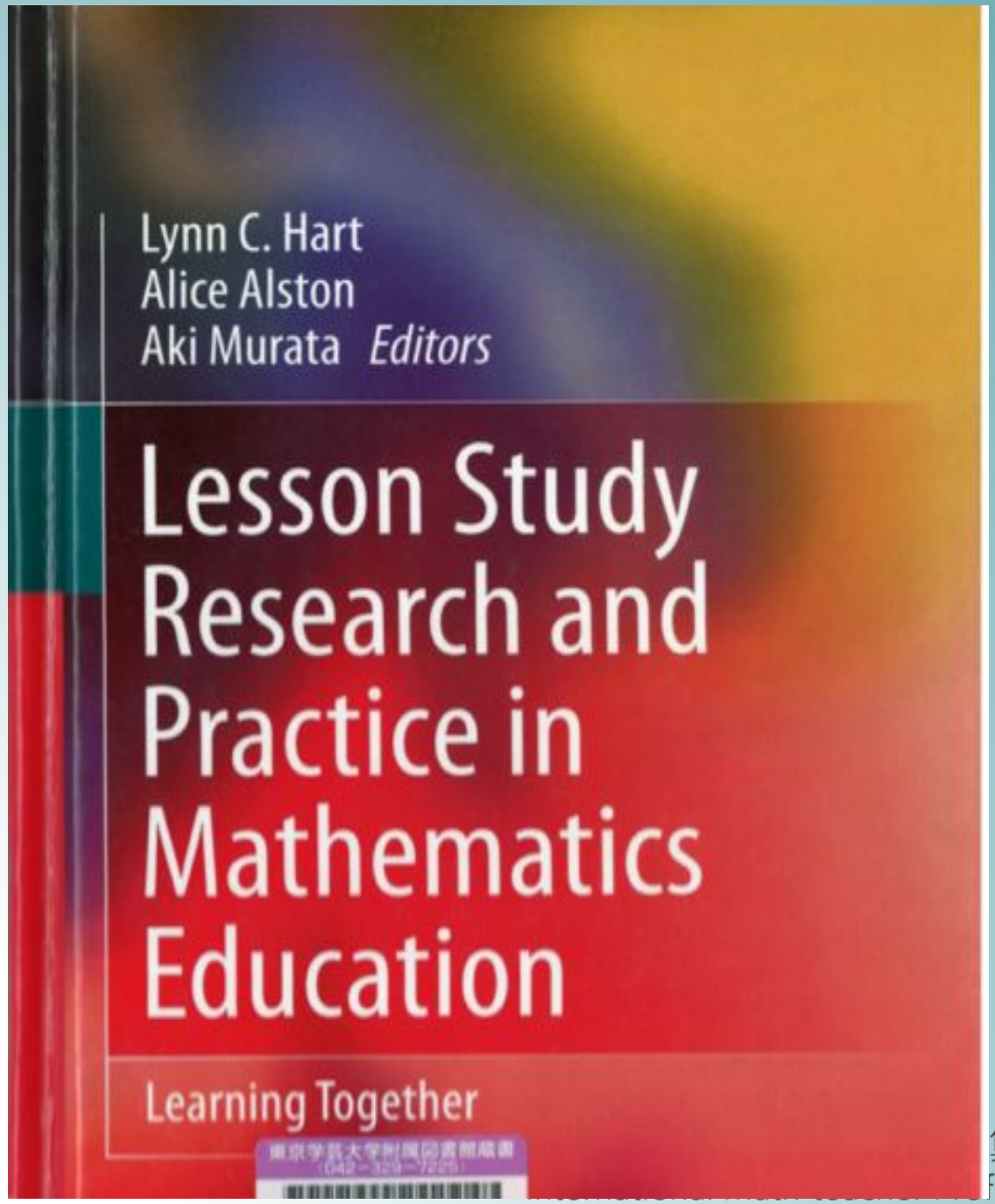
A Japanese Approach to Improving Mathematics Teaching and Learning

Fernandez & Yoshida (2004)

Lawrence Erlbaum Associates, Publishers


LESSON
STUDY
STEP by STEP
How
Teacher Learning Communities
Improve Instruction
DVD INCLUDED
1
2
3
4
Heinemann
Catherine C. Lewis and Jacqueline Hurd

2011


Lynn C. Hart
Alice Alston
Aki Murata Editors
Lesson Study Research and Practice in Mathematics Education
Learning Together

2011

Who is the fastest?（Speed）

- July 3 2013
- Sugekari Elementary School
- Grade6
- Instructor: Koko Morita

Who is the fastest?（Speed）

- Planning members:
- 5th and 6th grades teachers
- Research Steering Committee teachers
- Research lesson was held at July 3 2013

Who is the fastest?（Speed）

- Planning lesson: Dates
- May 21　30 minutes
- June 6　90 minutes
- June 11　20 minutes with final commentator
- June 18　90 minutes
- July 3 Research lesson

July 6: 10:33 How to present the task

これから速さを比べるときに4つの考えのうち、どの考えを使いますか？

C ①です。

C ②かな？

C 私は③です。

C やっぱり④がいいです。

T では、今日学習したことを生かして、この6人のかけっこの順位を1位から6位までつけてみましょう。

	距離（m）	時間（秒）	順位
A	40	6	
B	30	6	
C	30	[illegible]	
D	35	[illegible]	
E	42	[illegible]	
F	28	[illegible]	

C やっぱり、最小公倍数は面倒だ……

C 距離÷時間……（③の考え）

T 4つの考えはどれも正しい考えですが、一番使いやすいのはどの考えですか？

6

まず 次にこの6人の速さの順番を決めないと思うのですが 皆さんはどの考えを使いますか

名前カードとはらしたら

小数 これは使わないで？ せめて 5.5 ぐらい

☆ 50m 7.5

その考えを使うかそれぞれを発表させて下さい

いつでも使えるし、わかりやすい

C 時間でも距離でも いつでも使えるよ

C でも 少ない数が速いのは ちょっと分かりにくい。

それぞれ ①と②のよさも おさえたい

July 3

Grade 6 Mathematics Lesson Plan

Who is the fastest? (Speed)

Wed. July 3, 2013, 5th period
Meguro-ku Sugekari Elementary School Grade 6 (Class 1) 35 Students
Instructor: Yasuko Morita

Research Theme: "I did it! I understand it!" Designing lessons that students become absorbed. Devising instructions that care about students' questions and provide experiences for students to enjoy thinking and expressing.

1. Name of the Unit: Speed

2. Goals of the Unit

- Students are able to understand the meaning of speed, how to express it, and how to find it.
- Students are able to understand the relationship of three quantities: speed, time, and distance.

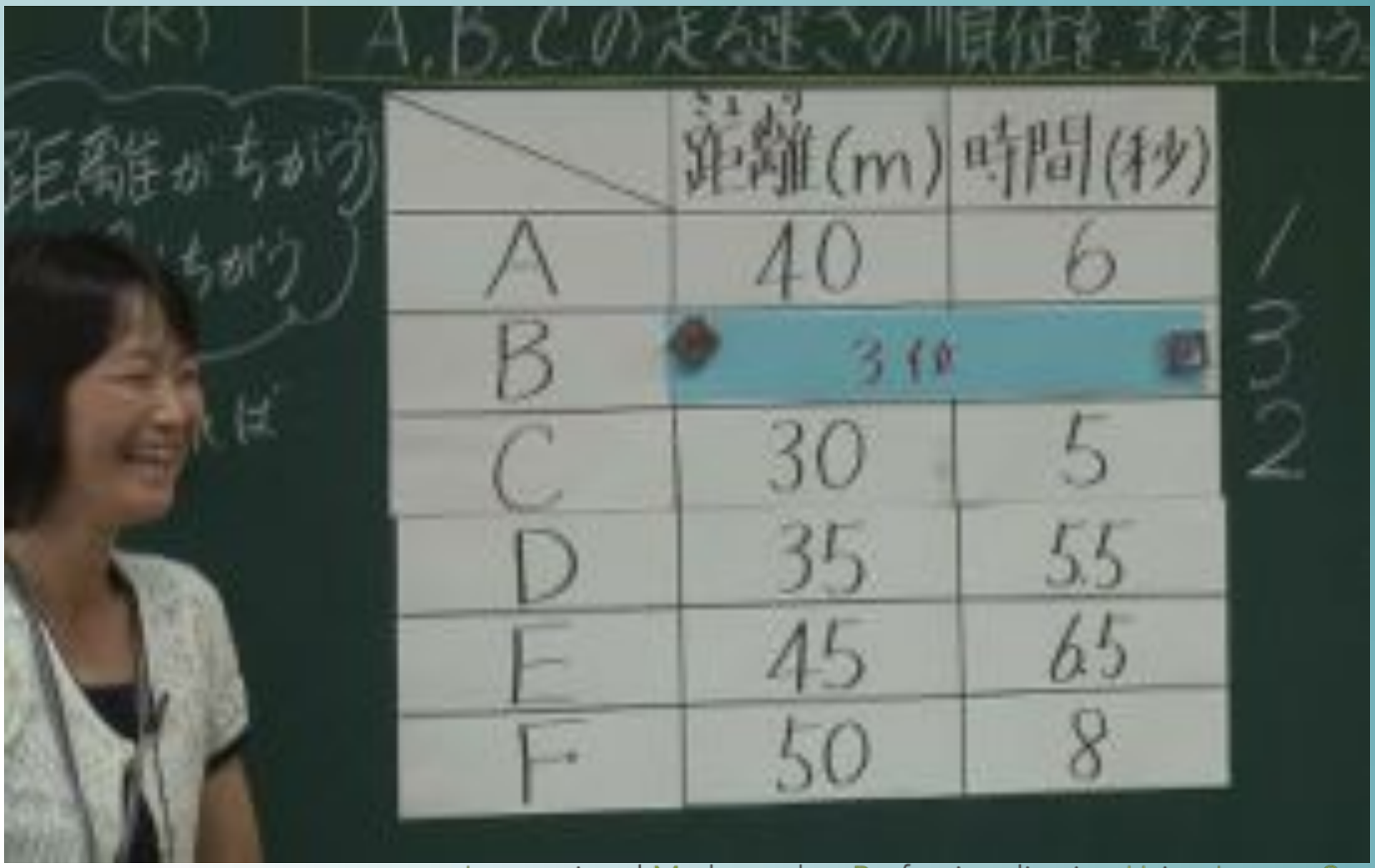
3. Evaluation of the Unit

Interest, Motivation, & Disposition	Students are applying idea of per unit quantities when they are finding speed. Also they are eager to apply speed in their study and daily lives.
Mathematical	Students are utilizing idea of per unit quantities when they are finding speed.

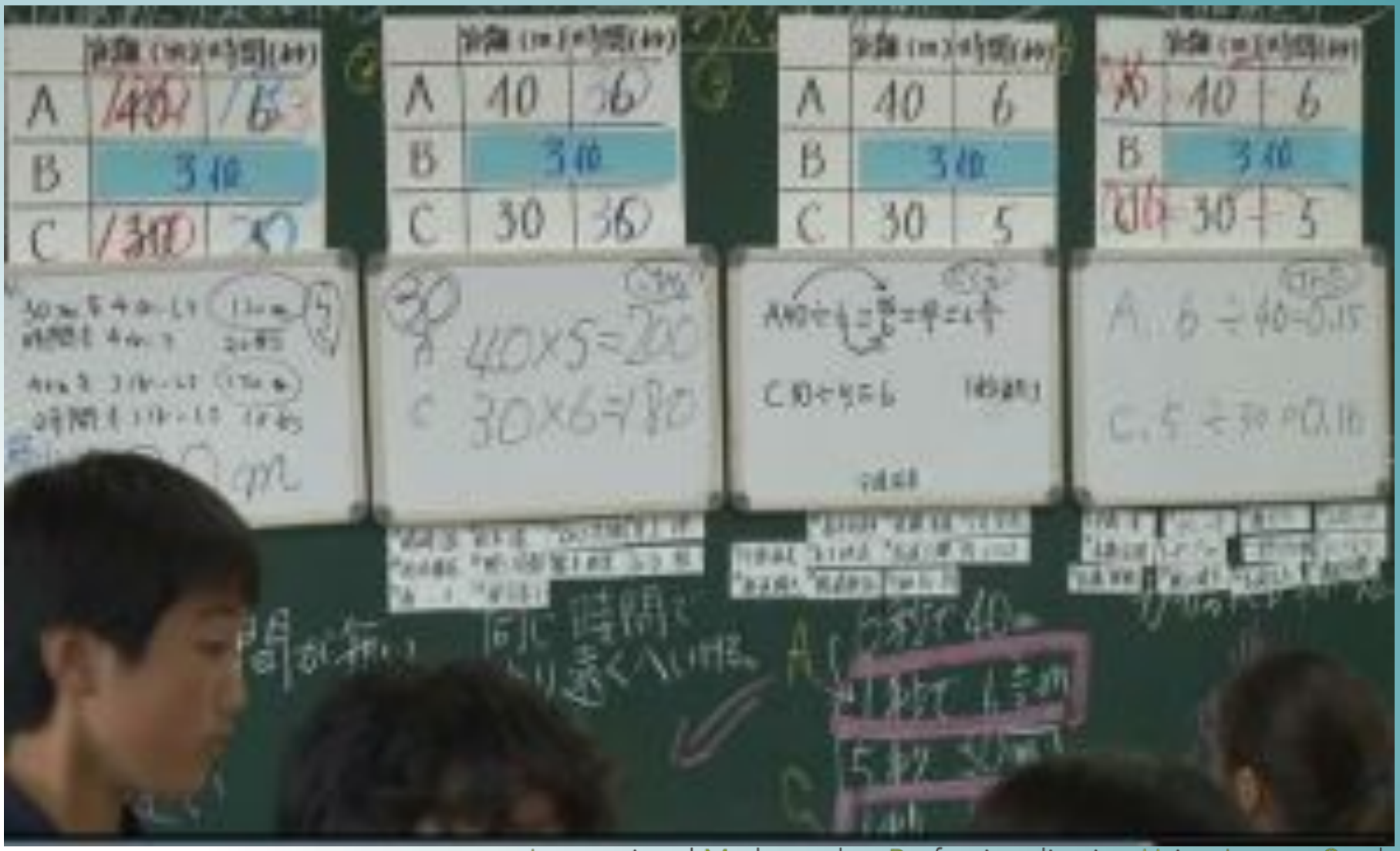
Distance（m）&Time（Second）

45:00Common idea or wisdom?
“To make the same condition!”

Now we have three more children to compare !



I prefer to use…



Which is faster?
A larger value (number) for indicating faster speed

“Expressing bigger number is faster ”

“To make the same condition”

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“Same idea !! :reduction to common denominator”

Post-lesson discussion: Principal talks first

Demo Teacher's reflection

Pair learning seems Ok but were not related to the whole class discussion.

Principal: needs to connect it to Today's lesson, suggesting at the forth solution

究プロジェクト
sing Lesson Study

From a special education teacher: difficulty for slow learner in comparison of two quantities

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Introduction period took too long?
The hints were appropriate?

The knowledgeable others gives final comments

Final commentator talks:

- Connecting the task to National course of study
- Connecting the lesson to **school mission** or theme of research lesson
- Meaning of "**Learning together**"
- **The importance of making same condition**
- **Decision making: by mathematical points of view also by individual experiences**

Final commentator talks:

- **The importance of making same condition**
- **Decision making: not only by mathematical points of view, but by individual experiences**
- **Meaning of division: a÷b＝X÷1**
- Connection results from national surveys
- Difficulty to understand the meaning of “30% off ?”

Final commentator talks:

- Textbook shows three se
  of numbers, however.....
- Density: Swimming Pool (5th grade)
- A 200 m² 15 people
- B 400 m² 45 people
- **Children could discuss more to appreciate the value of ratio and proportional reasoning**

Summarizing post-lesson discussion by vice-principal

Ending of post-lesson discussion

Better to discuss more about four solutions in order to identify key ideas

ロジェクト
Lesson Study

Hanseikai: Reflection: Lesson Study Needs Beers

Affordances and constrains

- Many aspects of Lesson Study that are well understood by Japanese teachers have not transferred readily to other countries.

Affordances and constrains

- For that transfer to happen,

Lesson Study needs to be more explicitly defined, including the beliefs and attitudes of Japanese teachers that underlie the process of Lesson Study.

Misconceptions revealed

- **Is Lesson Study a Workshop?**
- Lesson Plan to be taught exactly?
- Is the focus of consideration *teaching* or the *teacher*?
- Is Lesson Study a momentary activity?
- Is Structured Problem Solving Lesson just solving a task?
- Should a research lesson be always re-taught?
- Is observing a live lesson LS?

Lynn Liptak (from Lewis 2002) clearly stated

Traditional Workshop	Lesson Study
Begins with *answer*	Begins with *question*
Driven by outside "expert"	Driven by participants
Communication flow: trainer to teachers	Communication flow: among teachers
Hierarchical relations between trainer and teachers	Reciprocal relations among learners
Research informs practice	Practice **is** research

Misconceptions revealed

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Lesson Study Cycle in Zambia

In Zambia, lesson study is conducted by teachers of s

RL1

RL2

1. Defining Problem or Challenge

Teachers' group has a discussion on problems and challenges which can be targets of their lesson study. This work will motivate and direct their work. Problems will vary from teaching techniques to classroom issues.

2. Collaboratively Plan a Lesson

Teachers collaboratively plan a lesson based on identified needs and problems to be addressed. After considering objectives of lesson, they will discuss approach and materials for teaching/learning. By doing this work together, they will own a lesson plan as a group.

3. Implementing Demo-Lesson

A teacher is selected in a group to conduct the planned lesson in a classroom with normal situation at school. Other teachers observe lesson with particular points of interests. School managers and education experts will join observation.

4. Discuss Lesson & Reflect on its Effect

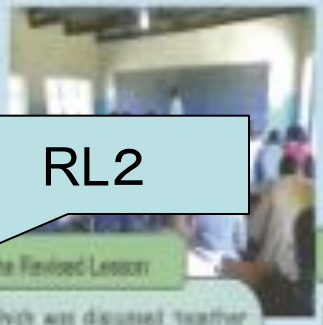
Teachers will meet to discuss the lesson and reflect on the effects of the lesson. Demonstration teacher will give his/her comments on the lesson, while observers share their observations. The focus of discussion is to improve the lesson for better teaching and learning.

5. Revise the Lesson

Together as a team of teachers, the lesson plan is revised based on the critique and reflections. Changes and adjustments are made and a modified lesson plan is prepared for presentation to another class by the same teacher.

6. Conduct the Revised Lesson

The lesson which was discussed together with reflections by the group is conducted by the same teacher but in a different class. Other teachers together with managers will observe particularly on how improvements of the lesson are effectively working.



7. Discuss the Lesson & Reflect

Observations of the change between the 1st lesson and revised lesson are shared among the teachers. Even minimal improvement is appreciated. Further suggestions for improvement are also discussed for each teacher to apply to their daily lessons.

8. Reflections compiled & shared

Reflections and suggestions gained through prior steps of lesson study are compiled and recorded as a group. This record can be fruitful reference for the teachers to know how their knowledge and skills on teaching are developed as professionals.

Should a research lesson be always re-taught?

- An inorganic system, like a car, is composed of parts that may be easily replaced.
- However, in an organic system like a lesson, each part is systemic, not systematic.

Should a research lesson be always re-taught?

- Changing one problematic part of the lesson does not guarantee things will work out once this part is fixed.

Should a research lesson be always re-taught?

- Another problem with re-teaching is that it reinforces an idea that **the same lesson plan can be used with different students.**
- In this kind of thinking, **the students are not an important consideration.**

Should a research lesson be always re-taught?

- re-teaching is disrespectful of the students' right to the best education one can provide them.

Should a research lesson be always re-taught?

- Having the thought of re-teaching at the back of one's mind is **like making the first class a pawn in order to improve classroom teaching.**

Should a research lesson be always re-taught?

- This benefits teachers and lesson plan makers at the expense of the children.

Designing Task

- Structured problem-solving lesson
- One-task-for-one-lesson
- without first demonstrating how to solve the problem

Designing Task: condition

- Within 10~20 minutes, several ways to solve
- Using children's previous experience or knowledge
- Mathematical & Educational Values

Designing Task : Evaluation

- The solution and strategies of solving the task will surely be discussed at *Comparing and discussing (Neriage)*.

Designing Task

- Therefore, the task may have the potential to produce several ways of solving it.

Designing Task

- Study on children's previous experience or knowledge & skill
- Study on the Curriculum
- Need to write a **detailed lesson proposal**

Designing Task

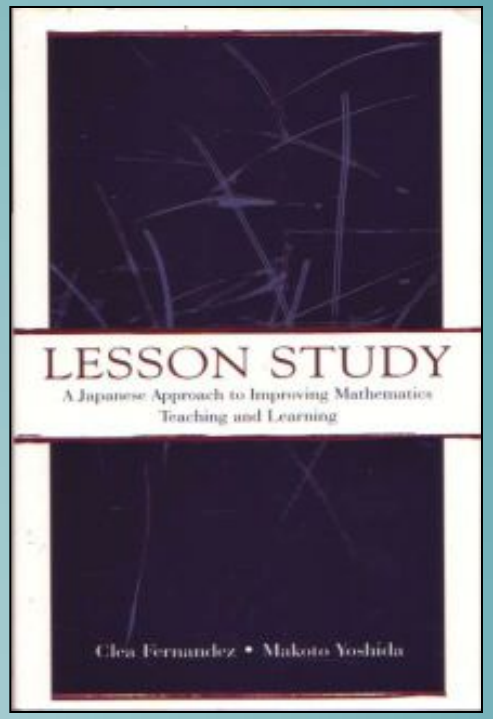
- Example
- 1st grade
- Two-digit number minus a single-digit number with borrowing.

Designing Task

- *One task for one lesson*
- *Can you select one task?*
- *Can you anticipated children's solutions?*

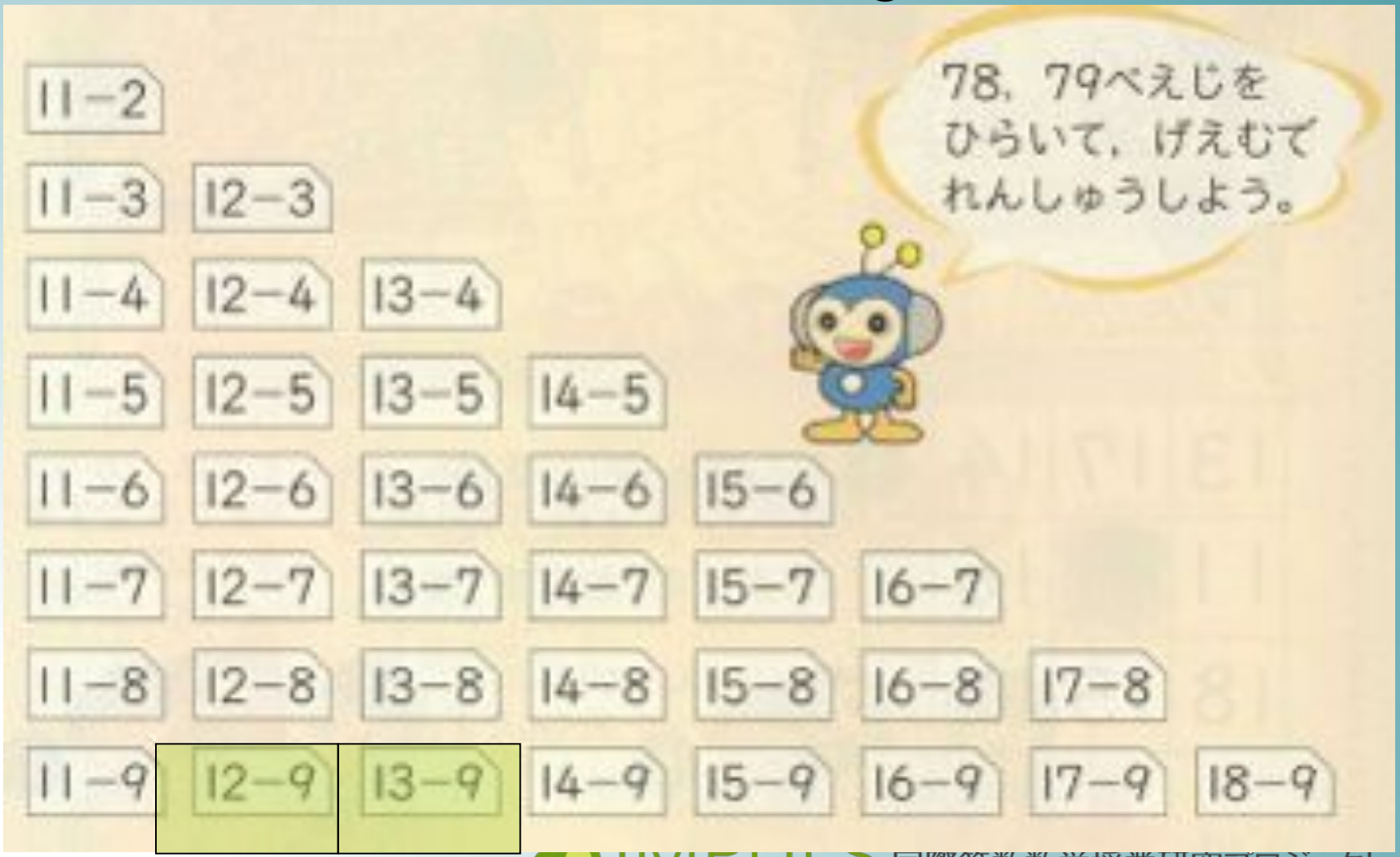
Japanese teachers engaged in detailed discussions

- textbooks : 13 – 9 or 12 – 9
- 15 – 8
- 15 – 7
- 11 – 6
- 12 – 7
- 13 – 7
- 13 – 6



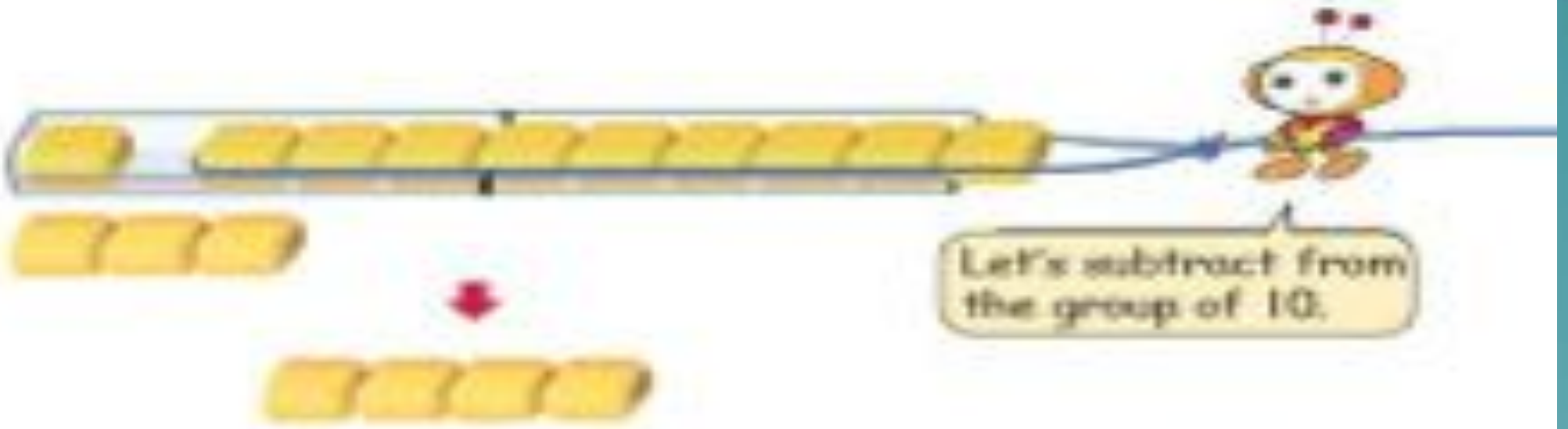
- two-digit number minus a single-digit number with borrowing

two-digit number minus a single-digit number with borrowing



Tasks from textbook: Typical order of tasks

東京書籍	13－9	14－8	12－3
啓林館	13－9	12－7	13－4
大日本	13－9	11－8	12－3
学校図書	12－9	13－8	11－3
教育出版	12－9		12－3
大阪書籍	15－8	12－7	13－4



$13 - 9 =$ ☐

Answer : ☐ tiles

How to calculate 13−9

① You can't subtract 9 from 3.

② Split 13 into 10 and 3.

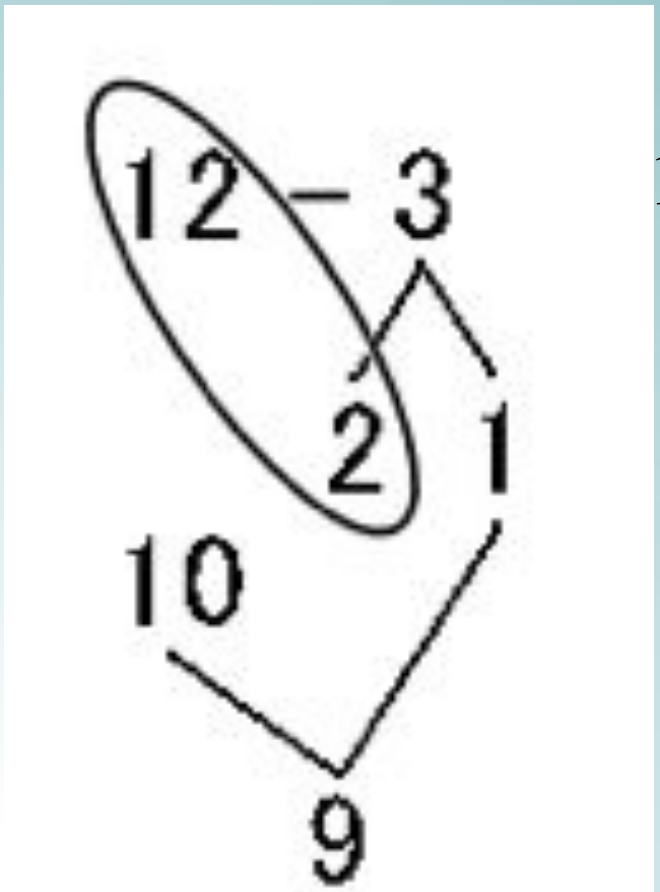
$$13 - 9$$

10 3

③ Subtract 9 from 10 and get 1.

④ 1 and 3 make 4.

subtraction-subtraction-strategy



$$12-3=12-(2+1)$$

$$=(12-2)-1 \quad \text{subtraction}$$

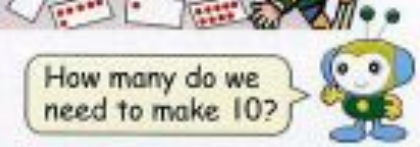
$$\Big|$$

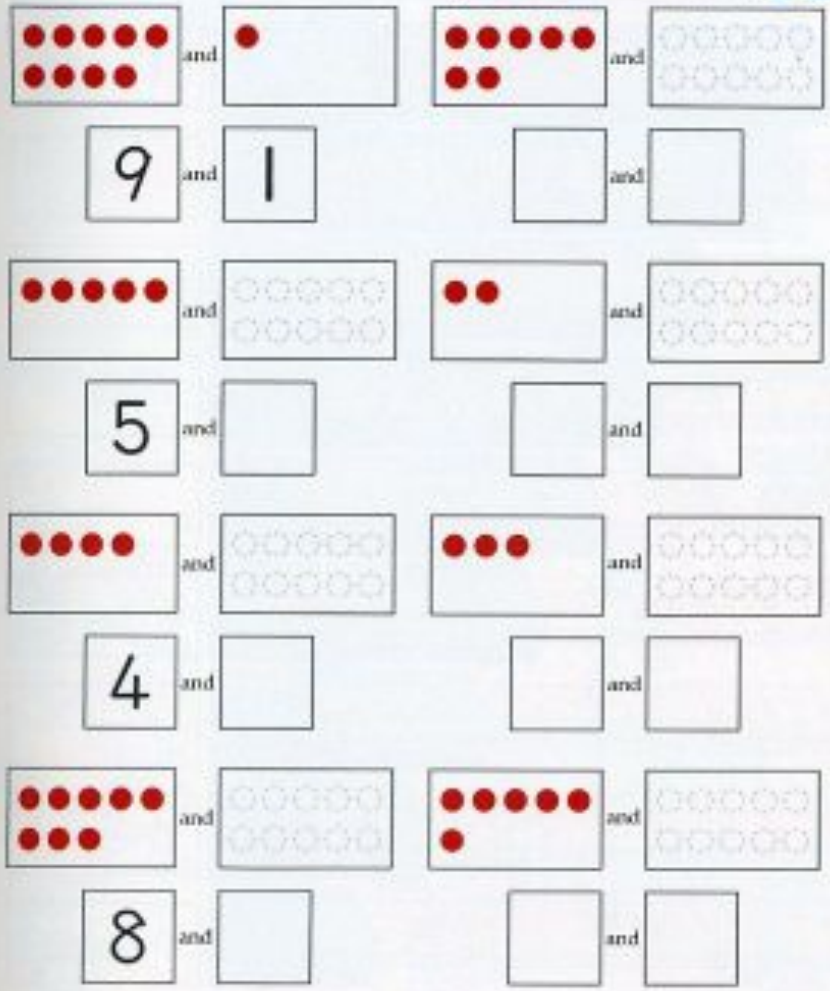
$$=10-1 \quad \text{subtraction}$$

$$\Big|$$

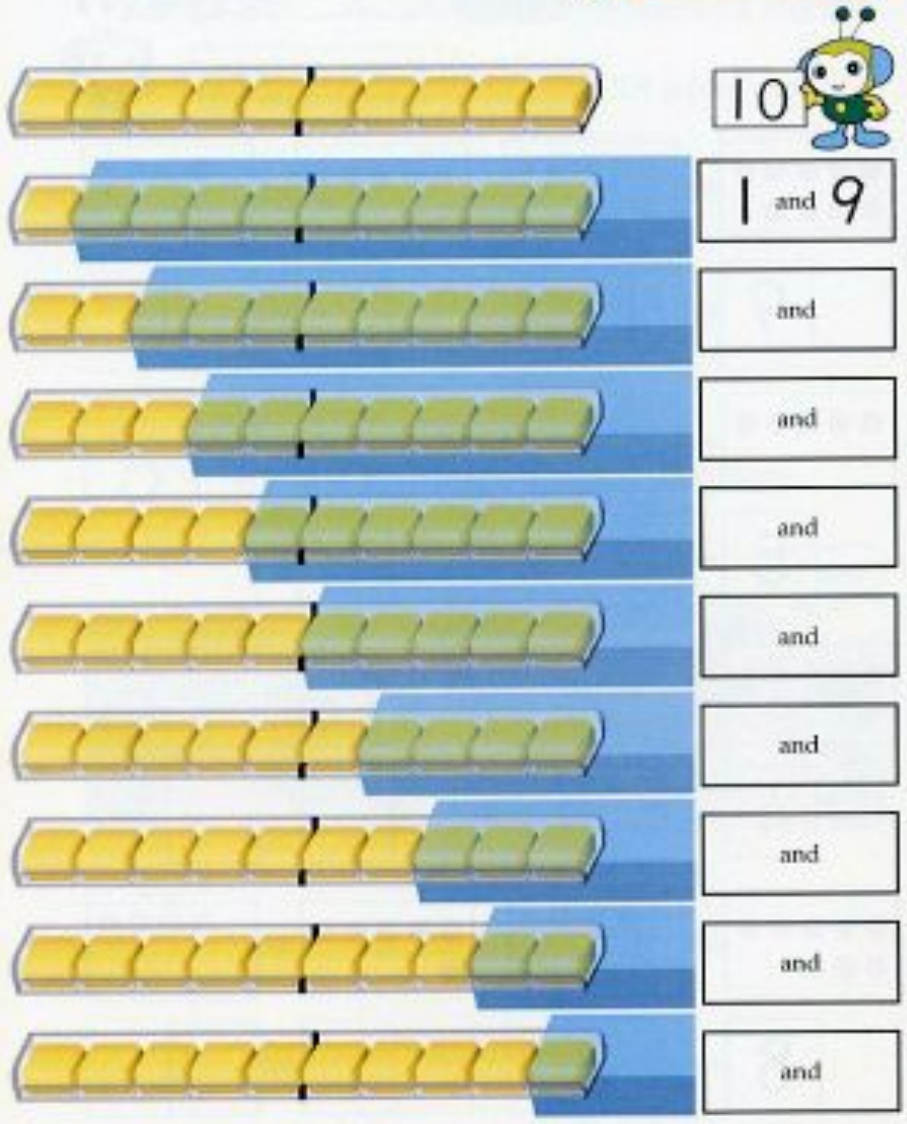
$$=9 \quad \text{strategy}$$

Let's make 10!





How many and how many make 10?



25


6
8
9 and 1 make 10.
26

DISCUSSIONS

- Considering the exact number in the task does not mean Japanese teachers are sticking into a concrete level of thinking, and trying to let students think things concretely.
- The reality is opposite.

DISCUSSIONS

- Teachers are considering the general aspect of the number-- that is quasi-variable aspects.
- The quasi-variable is a number but it has a nature of generality (Fujii, T. and Stephens, M. 2001, 2008). In other words, numbers in the task are used as representatives.
- Therefore, how far we can say from the task and solution of the task may need to be considered profoundly in designing the task.

DISCUSSIONS

- the task 13-9 or 12-9 is likely to lead to the subtraction-addition strategy
- the task is not just a calculation problem, but it leads the general procedure of subtraction with borrowing in the base-ten system.

DISCUSSIONS

- it implies the meaning of calculation in general.
- we express numbers in certain system and calculate them based on the feature of that representation system.

Remarks

- **Task design in Lesson Study always involves anticipating students' solutions**
- **Task design in Lesson Study goes with task evaluation**

In lesson study, teachers must

attend to a very important step in the research process called *kyozaikenkyu*

(rough translation = research on teaching materials)

Knowledge for Teaching

kyozaikenkyu is both study and research on teaching materials from mathematical and educational point of view as well as from the students' point of view