



 Free Program for SEAMEO School Network
 from the University of Tsukuba, Affiliate Member of SEAMEO
**Teaching Mathematics to Develop Mathematical Thinking as Higher Order Thinking:
 How do you teach? Why?**

Lesson 4: How to introduce addition

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Adopting a 21st Century Curriculum

Revitalizing Teacher Education

Set (cardinal) Number
Ordinal Number
Denominated number and quantity

Number

- Existence and necessity
- Order
- Larger or Smaller
- Greater or Less
- Operations

Review

Contents

Numbers

- 1 Numbers up to 10..... 5
- 2 How Many?..... 26
- 3 Numerical Order..... 32
- 4 Addition..... 34
- 5 Subtraction..... 46

Shapes

- 1 Numbers Larger than 10..... 60
- 2 Which is More?..... 7
- 3 Look for Numbers..... 7
- 4 Addition for Japan's Budget..... 12
- 5 Shapes..... 60

Try to teach how to extend the number

In Japan:
Make sense (understand meaning)
Think about how to calculate/operate/find the easier way to answer.
Acquisition of proficiency

When we call it as addition? Addition is binominal op.

Additional sentence to explain manipulation of concrete and semi-concrete object at the beginning.

① How many children are there in all?
Equation: $3 + 2 = 5$
Answer: 5 children

② Let's do addition.
 $2 + 1 = 3$ $1 + 4 = 5$ $3 + 1 = 4$ $2 + 3 = 5$
How children get the answer?

③ There are 5 red flowers and 4 white flowers.
How many flowers are there in all?
Equation: $5 + 4 = 9$
Answer: 9 flowers

④ Make a problem for $2 + 5$.

⑤ Make a problem for $2 + 5$.

Addition situation for different set

Translation from addition expression to story problem

Review		
TOPIC 1: INTRODUCTION	L1: Introductory discussion to develop mathematical thinking (17/03/21)	
TOPIC 2: NUMBERS	L2: How to introduce number (20/03/21)	L3: What is number (24/03/21)
TOPIC 3: ADDITION AND SUBTRACTION	L4: How to introduce addition (27/03/21)	L5: What is addition (31/03/21)
	L6: How to introduce subtraction (03/04/21)	L7: What is subtraction (07/04/21)
TOPIC 4: EXTEND NUMBER TO 100 WITH ADDITION AND SUBTRACTION USING COLUMN FORM	L8: How to extend number to more than 10 (10/04/21)	L9: How to extend addition (14/04/21)
	L10: How to extend subtraction (17/04/21)	L11: How to extend number to more than 100 (21/04/21)
	L12: How to introduce column addition (24/04/21)	L13: How to introduce column subtraction (28/04/21)
TOPIC 5: MULTIPLICATION	L14: How to introduce multiplication (01/05/21)	L15: How to develop multiplication table (05/05/21)
	L16: What is the multiplication table (08/05/21)	L17: How to introduce column multiplication (12/05/21)
TOPIC 6: DIVISION	L18: How to introduce division (15/05/21)	L19: How to extend division with remainder (19/05/21)
TOPIC 7: REFLECTIVE DISCUSSION	L20: Panel-Reflective discussion for summary (22/05/21)	

Learning How to Learn from **repetition of similar tasks** by using what already learned.
Task sequence for preparation of future learning.

Review

How Many?

Mathematical Ideas for Set, Unit, Compare.

Pose question and develop explanation such as why and when.


These numbers are in order.

How do you explain by using your terminology?

Story Problems
Altogether Situation A, B, C, ...
Concrete Object manipulative
Explanation by sentences

Mathematical Modeling
Explanation with blocks
Semi Concrete Object

Math expression
Addition: operation
Math sentence addition



Mathematical Values, Attitudes and Habits for Human Character

Mathematical Values:
Generality and Expandability
Reasonableness and Harmony
Usefulness and Efficient
Simpler and Easier
Beautifulness

Mathematical Attitude attempting to:
See and think mathematically
Pose question and develop explanation such as why and when
Generalize and extend
Appreciate others' idea and change representation to conceptualize

Habits of mind for Citizen to live:
Reasonably and critically with respecting and appreciating others
Autonomously Creatively and innovatively in harmony
Judiciously using tools such as ICT
Empower in imagining the future through lifelong learning

Mathematical Thinking and Processes

Mathematical Thinking:
Generalization and Specialization
Extension and Integration
Inductive, Analogical and Deductive reasoning
Abstracting, Concretizing and Embodiment
Objectifying by representing and symbolizing
Relational and Functional thinking
Thinking forward and backward

Mathematical Activities for:
Problem Solving
Exploration and Inquiry
Mathematical Modeling
Conjecturing, Justifying and Proving
Conceptualization and Proceduralization
Representation and Sharing

Content

- Numbers & Operations
- Quantity & Measurement
- Shapes, Figures and Solids
- Pattern & Data Representations
- Extension of Number and Operations
- Space & Geometry
- Measurement & Relations
- Plane Figures & Space Solids
- Data Handling & Graphs
- Number & Algebra
- Relationship & Functions
- Statistics & Probability

Curriculum Standards: SEABES-CCRLS (by SEAMEO-RECSAM (Mangao, Ahmad, Isoda; 2017))

Reflection
Acquisition
Mathematical Thinking
HOTS is Math. T.

How do you teach addition?

Translation into semi concrete ob.
Translation into math-sentence

4 Addition (I)

① How many goldfish are there in all?
Equation: $3 + 2 = 5$
Answer: 5 fish

② Write an equation and get the answer.
① How many cows are there in all?
Equation: $3 + 2 = 5$
Answer: 5 cows

Altogether Situation (for the translation)

What children learn on this task sequence.

Understand the way of translation

Then, what shall we do next step: Situation of **Increase**

How Many More?

① There are ducks. How many ducks are there in all?
Equation: $3 + 2 = 5$
Answer: 5 ducks


② If you add 2 goldfish, how many goldfish are there?
Equation: $3 + 2 = 5$
Answer: 5 fish

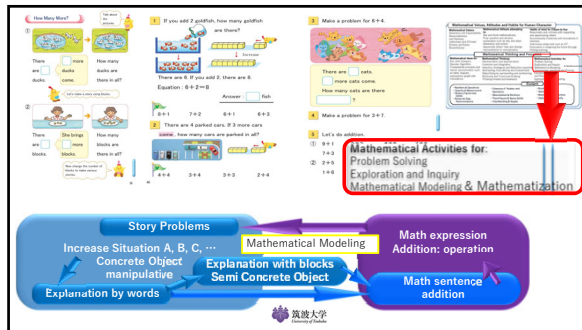
③ Make a problem for $2 + 5$.

Story Problems
Increase Situation A, B, C, ...
Concrete Object manipulative
Explanation by sentences

Mathematical Modeling
Explanation with blocks
Semi Concrete Object

Math expression
Addition: operation
Math sentence addition





What did you learned?

Number

- Existence and necessity
- Order
- Larger or Smaller
- Greater or Less
- Operations

In Japan:

Make sense (understand meaning)

Think about how to calculate/operate/find the easier way to answer

Acquisition of proficiency

Try to teach how to extend the number

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Shapes

1 Shapes 60



References

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