

Children's Learning Activities with 'Bamboo Numbers'

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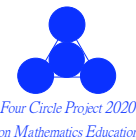
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19th September, 2009
Symposium mathe 2000, Universität Dortmund

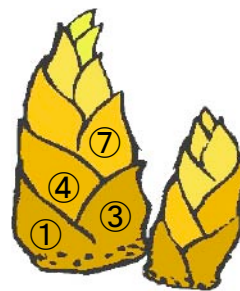


Purpose of the presentation

(1) To introduce a SLE 'Bamboo numbers' which is derived from the Fibonacci sequence.

(2) To report the findings from our pilot lessons undertaken for Grade 2 children (8 yrs old)

(3) And to discuss 'how should we design an environment to develop children's mathematical thinking?', etc.



Plan of presentation

- (1) I will talk about the overall background of our research project, FCP2020
- (2) Nagisa will explain mathematical and pedagogical background of our newly developed SLE, the bamboo numbers.
- (3) Hiro and Souta will report how children engaged the bamboo numbers in our pilot lessons.



I . Four circle project 2020

1.The final goal

To develop mathematics lessons in which students actively engage in rich mathematical activities and hence acquire a body of knowledge about mathematics.



I . Four circle project 2020

2.The approach

A systemic research network in mathematics education.

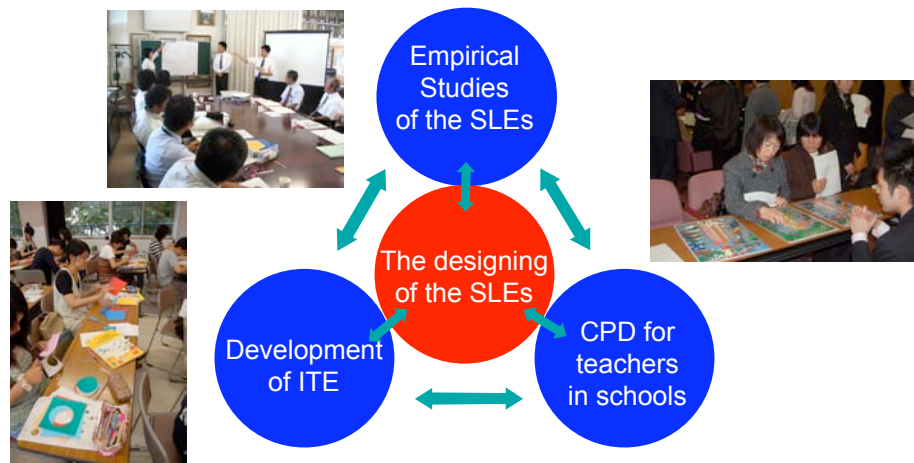


Figure. 1: Four inter-related domains of mathematics education research

I . Four circle project 2020

3.Basic ideas of developing the SLEs

We regard 'mathematics' for children and students as 'a vital science of dynamic patterns'

"What matters is not the science of ready-made and static patterns but **the vital science of dynamic patterns** which can be developed globally in the curriculum as well as explored, continued, re-shaped, and invented locally by learners themselves." (Wittmann: 2005)

Bamboo in Japanese culture

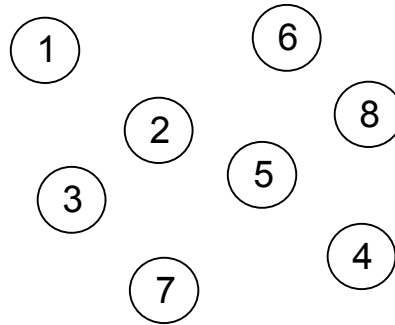


Growing Bamboo in Spring



II . Bamboo numbers as a SLE

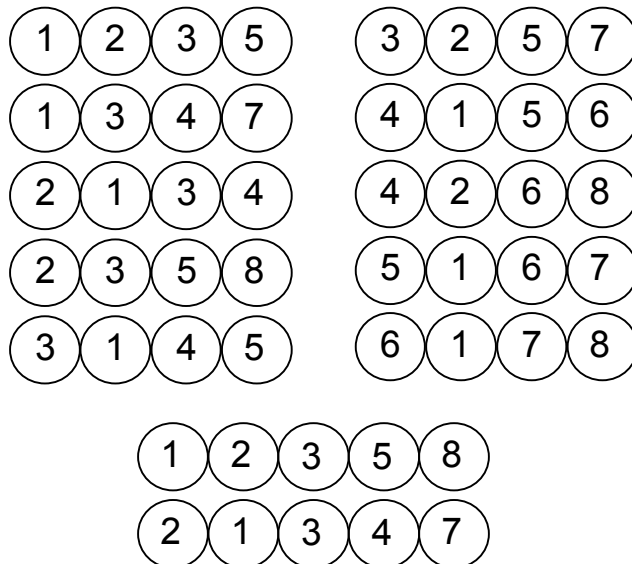
Introduction of Bamboo numbers



A bamboo number: (1) (3) (4) (7)

II . Bamboo numbers as a SLE

Bamboo numbers with 1- 8 cards



II . Bamboo numbers as a SLE

Worksheets of the Bamboo Numbers

Worksheet (1)

2	1			7
2			6	10
2		5		13
			10	16
2				19

What do you notice here?

Worksheet (2)

			10
2	4	6	10
			10
			10
			10

What do you notice here?

Worksheet (3)

2	5			19
2		8		22
2				25
2				34

What do you notice here?

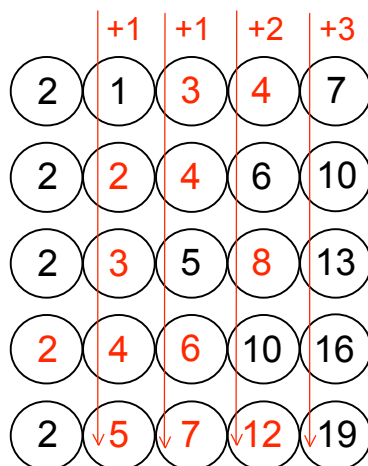
1

2

3

II . Bamboo numbers as a SLE

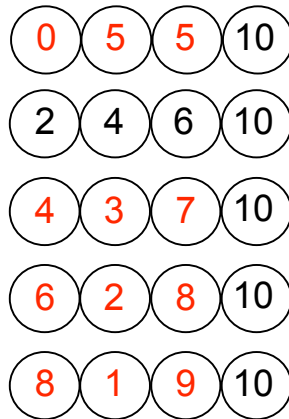
Worksheet 1



What do you notice here?

II . Bamboo numbers as a SLE

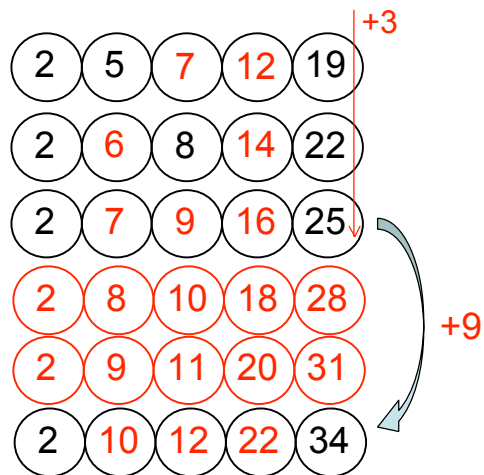
Worksheet 2



What do you notice here?

II . Bamboo numbers as a SLE

Worksheet 3



What do you notice here?

III. Children's activities with the Bamboo numbers

Typical Japanese classroom



III. Children's activities with the Bamboo numbers

Child's activity with the Worksheet 3

2 5 7 12 19

2 6 8 14 22

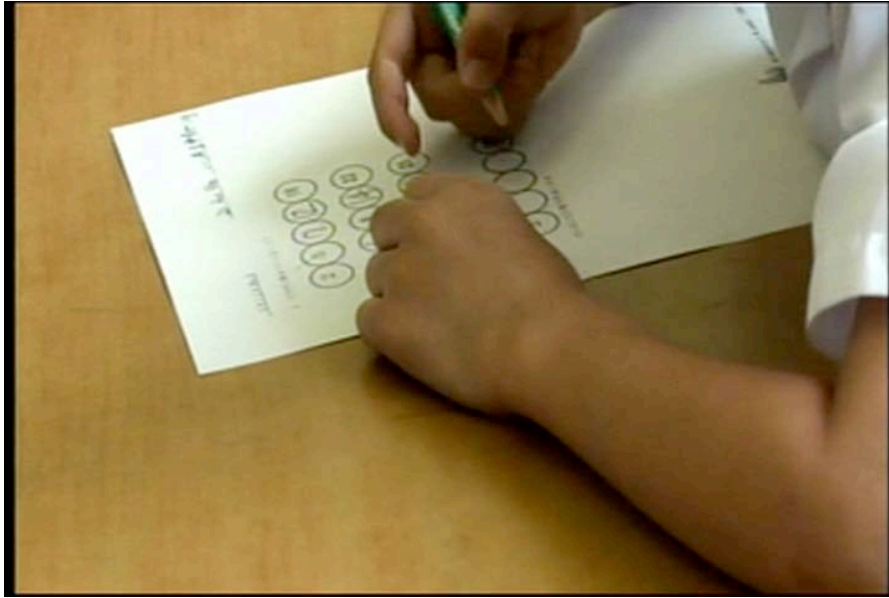
2 7 9 16 25

2 9 34



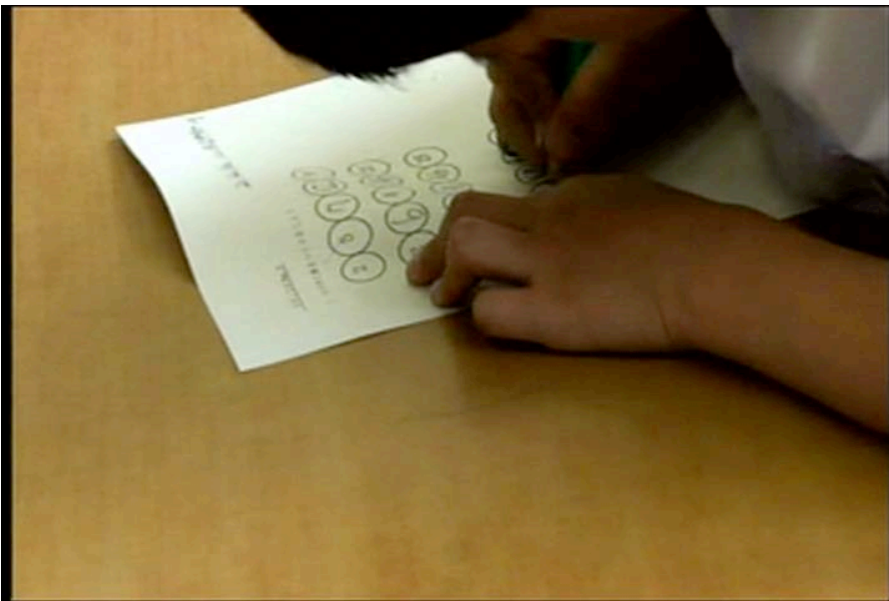
III. Children's activities with the Bamboo numbers

“ Number 9 doesn't work well !”



III. Children's activities with the Bamboo numbers

“ I can do it with 10 !!”



III. Children's activities with the Bamboo numbers

A child's worksheet (1)

5月12日 No.3 7年2組 西条 光人

1 たけのこ数をつくってみよう

また2とん5
89がぬけてい
1011がぬけている
①⑥⑦⑫⑲⑳

2 13 15 28 48

Arranged by S. Miyawaki, 2009. 5. 2

III. Children's activities with the Bamboo numbers

A child's worksheet (2)

5月12日 No.3 7年2組 西条 光人

1 たけのこ数をつくってみよう

いろいろおいてみると3にしるんぬかすかいてみんないもたてたいきたりました。

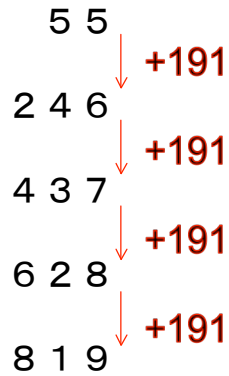
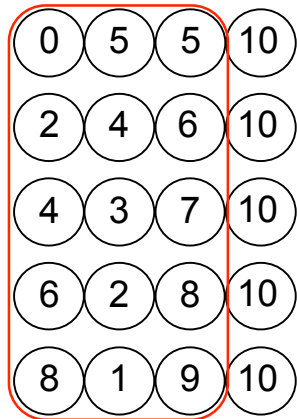
せんいん2

III. Children's activities with the Bamboo numbers

Wonderful pattern in worksheet 2

Bamboo numbers

Three digits numbers from the BNs



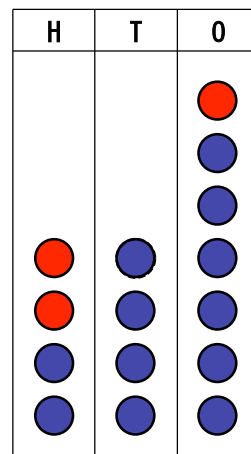
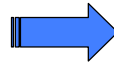
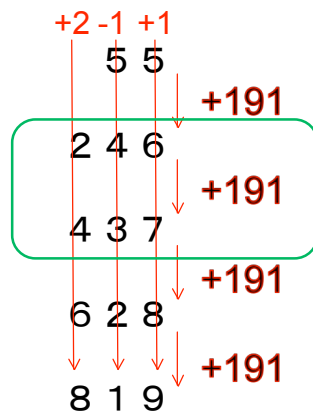
A wonderful pattern : The difference is always 191

III. Children's activities with the Bamboo numbers

Operative proof with counters

Three digits numbers from the BNs

246 → 437



$$+200 - 10 + 1 = 191$$

Summary

- (1) The bamboo numbers can provide children with opportunities not only to experience genuine mathematical patterns and creativities, but also to consolidate their skills in addition and subtraction in general.

- (2) The principle of 'mathematics as a vital science of dynamic patterns' is a powerful idea for designing SLEs, and mathematics teaching in all levels!

Vielen Dank

We hope that our children grow in the rich SLEs just like a bamboo flexibly and strongly.

