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CALCULATOR FOR CRITICAL THINKING IN MATHEMATICS LESSON: EXPERIENCE WITH 4TH GRADE STUDENTS

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INTRODUCTION

CONS

Widespread apprehension that continuous use of calculator will hinder the students' understanding of basic mathematical. procedures and their skills acquisition, especially in lower grades

PROS

Research finding suggest that calculator impact the students' problem solving skills and attitude toward mathematics in positive way

Calculator is widely available and affordable means to start with technology.

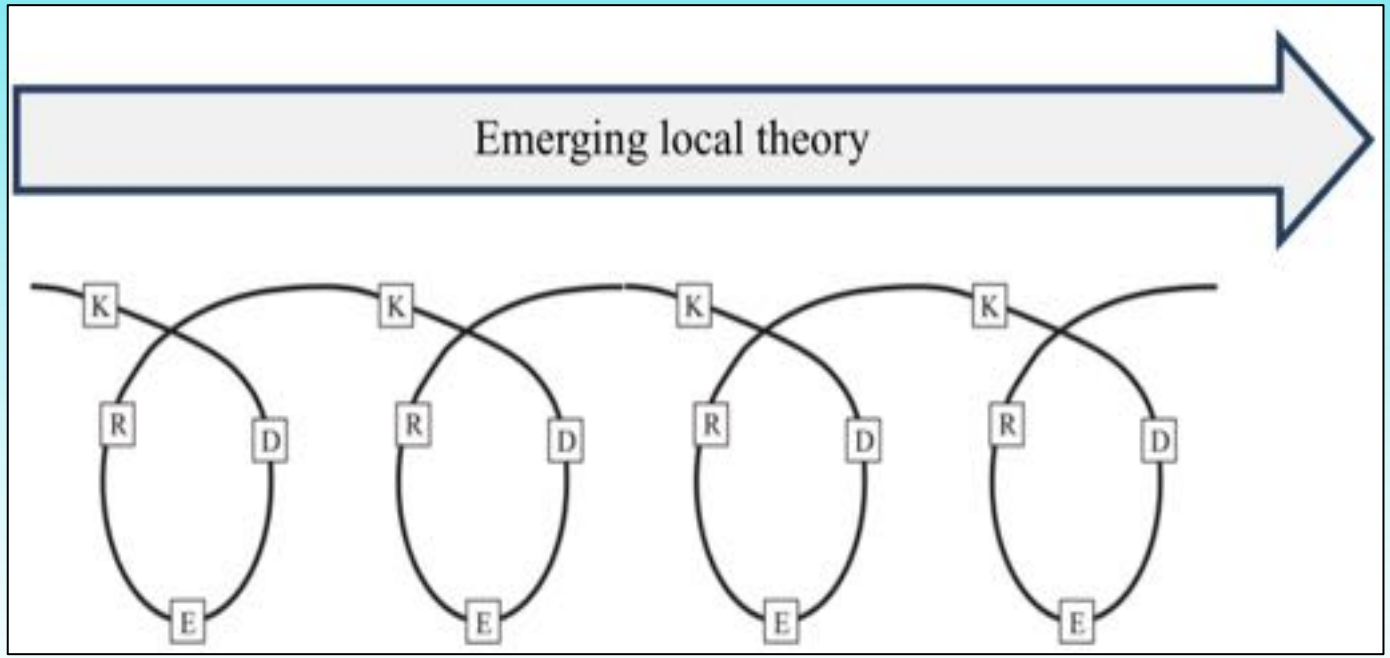
INTRODUCTION

There is a need to change teachers' perspective toward calculators → More research is needed

More research is needed ↓ How calculator impact the students' critical thinking → Research question: *how does the use of calculator support 4th grade students critical thinking in mathematics classroom?*

METHOD

- DESIGN RESEARCH



DESIGN PHASE
Based on the current knowledge (K), which comprises literature review, curriculum documents, and school textbook, the researcher design (D) learning activities.

TEACHING EXPERIMENT PHASE
The activities are put into practice in teaching experiment (E).

RETROSPECTIVE ANALYSIS PHASE
the researcher reflect on the result of teaching experiment, which contribute to new knowledge. The new knowledge then starts a new cycle.

METHOD

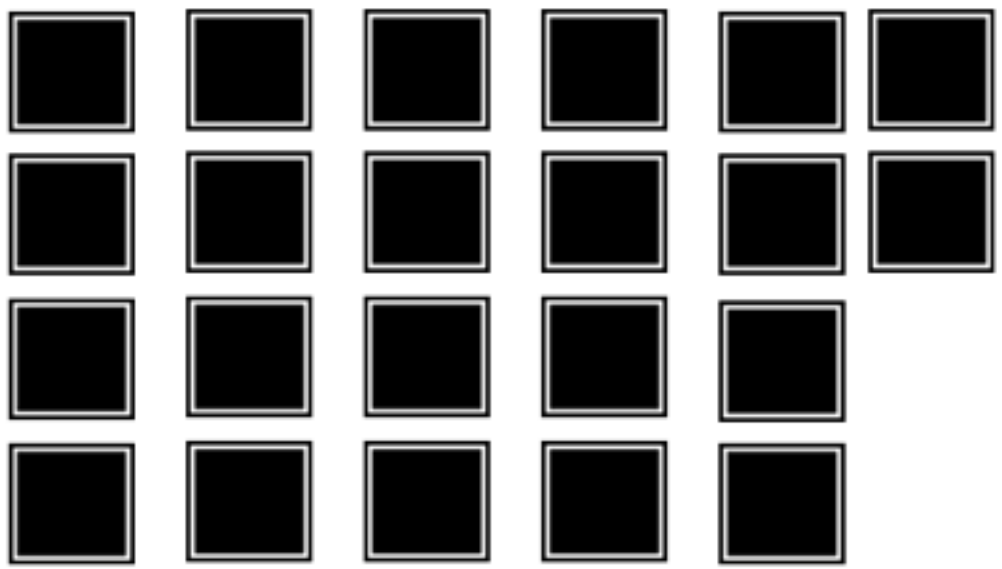
- LESSON DESIGN

Four ways to use calculator in the classroom (to avoid its being used merely as computing aid)

- *computation implementation/ calculation*
- *result checking/affirmation*
- *trial improving/exploration*
- *structure modelling/representation*

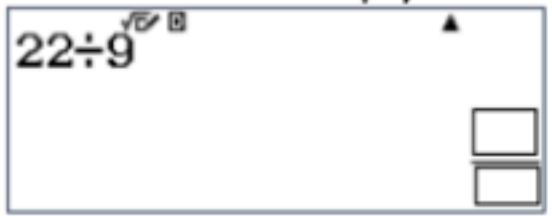
The task we design use the last one, which is using calculator to demonstrate numerical structure or concept.

1. One solar panel needs nine cells. Donny wants to make some solar panels, but he finds it difficult. Why do you think?



What mathematics operation can you use to solve the problem above?

2. Let's solve the problem above using calculator! You will get the following display. What numbers should be in the empty boxes?



Which one is larger: numerator or denominator?

3. Push SHIFT then S⇔D on your calculator. You will get the following display. Let's fill in the empty spaces!

Let's connect it with Donny's problem. Where does the 2 come from? How about the numerator?

METHOD

- LESSON DESIGN

Learning objectives:

- Understanding mixed fraction
- Changing regular fraction to mixed fraction, and vice versa

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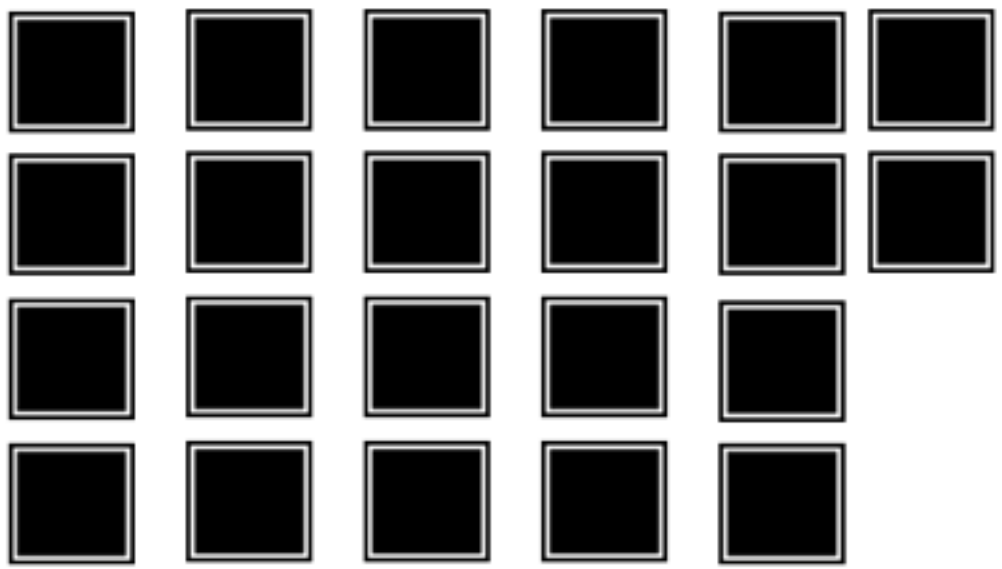

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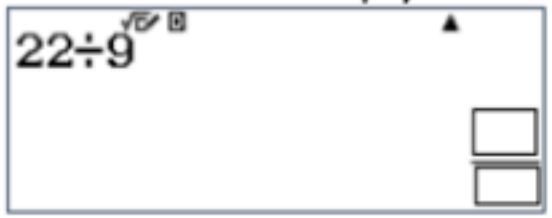

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METHOD

- RESEARCH SETTING AND DATA COLLECTION

The study consist of **four cycles**; this presentation report the **first** cycle.

Location: primary school in Yogyakarta.

Participants: Twenty 4th grade students participated in the first cycle. Rarely use calculator in school. **Prior knowledge**: regular fraction.

Classroom setting: During the lesson, the students were split into groups of four. The teacher who normally teach the class, taught the lesson.

Data is collected through **video recording.**

METHOD

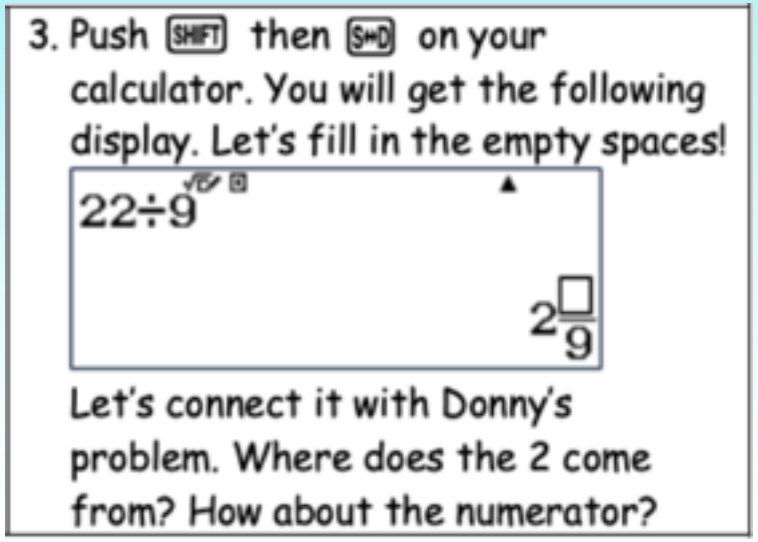
- DATA ANALYSIS

Code	Meaning	Description
I1	Interpretation	Comprehending and expressing the students' own understanding of the problem
I2	Inference	To identify and secure elements needed to draw reasonable conclusion; to form conjectures and hypothesis
A	Analysis	To identify the intended and actual inferential relationship in the problem, either among statements or information; making connection
E1	Evaluation	Judging and assessing information available in the problem.
E2	Explanation	Explaining the results of one's reasoning
S	Self-regulation	Related to metacognition, self-consciously monitoring, assessing, and evaluating one's learning

RESULT

- The result suggest that the majority of instances related to critical thinking in the video recording fall under Interpretation (I1) and Analysis (A). Minimal evidence on Explanation (E2) was available, as the students had a hard time formulating their thoughts, either in written or spoken words. On the other hand, no evidence is identified on Evaluation (E1), Inference (I2), and Self-regulation (S)

- The types of critical thinking appear during calculator-enhanced task is Analysis, which is during question no. 3, where the students have to identify the meaning of whole number and numerator in mixed fraction.



CONCLUSION AND DISCUSSION

- The use of calculator in primary school can support the students' critical thinking, specifically Analysis skills, through its *Structure Modelling* or *Representation* purpose.
- Open-ended problems and associating activities are confirmed strategies in developing critical thinking of young learners
- Suggestion: future research to venture into other purposes of calculators and other cognitive skills in critical thinking, as well as the connection between the two.
- Limitation: small sample and the limited timeframe.