Tasks of Teaching

For integrating ICT in Maths classroom activities

Lecture 3 – 05/10/23 – PART ONE

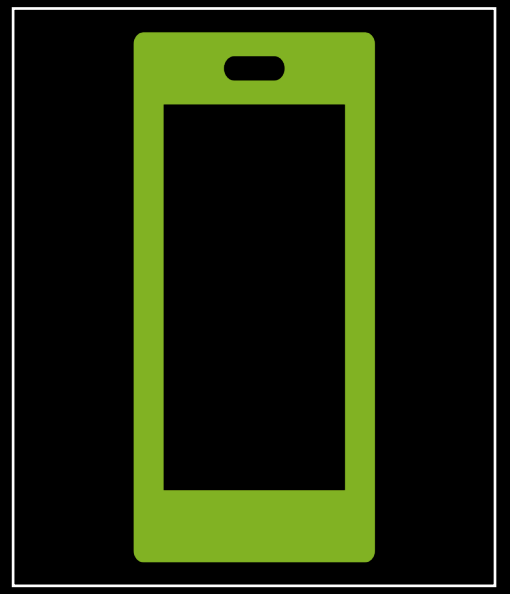
Technology in Mathematics Education

HOW DO TEACHERS BUILD THEIR TASKS TOWARDS ICT INTEGRATION?

(Etkina et al., 2016)

WHICH DISPOSITIONS?

To learn technologies



To use technologies

WHICH SKILLS?

Personal

Teachers must first acquire basic skills to master the specific technology they intend to use and develop utilization schemes related to this technology

Professional

Teachers must also develop their understanding of how to support students' mathematics learning in a digital environment

INSTRUMENTAL GENESIS

WHICH KNOWLEDGE?

MATHEMATICAL KNOWLEDGE FOR TEACHING WITH TECHNOLOGY

KNOWLDEGE OF TASKS OF MATHEMATICAL TEACHING

Tasks referred to knowledge of students and content

CATEGORIES	INDICATORS
Knowledge of students' understanding (conception and preconception)	Predict students' preconceptions about the learning task prerequisite materials (mathematical and mathematical literacy).
	Predict mathematical knowledge and mathematical literacy skills that students will be able to understand from the learning task
	Predict how students will be able to understand the learning materials through the use of representation, reasoning or mathematical tools selected on the learning task.
	Anticipate what students usually do after the learning task is given

(Lestari et al., 2019)

CATEGORIES	INDICATORS
Knowledge of student interest and motivation	Predict students' interest and motivation about the mathematical literacy issues, examples or tasks to be assigned.
	Understand how to motivate students to actively participate in learning tasks
Knowledge of misconceptions, mistakes, or student difficulties	Understand how to identify mathematical material and mathematical literacy on a learning task that often creates difficulties, misconceptions or student errors
	Predict the preconceptions or conceptions that lead to misconceptions
	Predict mathematical material, mathematical literacy skills or fundamental mathematical abilities that are difficult to understand or master in the learning task
	Predict the source or cause of difficulties, errors / misconceptions that often occur in students
	Anticipate difficulties, mistakes or misconceptions of students, in connecting, using mathematical knowledge, reasoning, problem solving

(Lestari et al., 2019)

Tasks referred to knowledge of content and teaching

CATEGORIES	INDICATORS
Organizing learning tasks	Choose the prerequisite materials that match the learning task to be provided organize and sort the presentation of learning tasks to facilitate learning activities
	Choose mathematics and mathematical literacy tasks in accordance with the strategy used
	Choose an example appropriate for the purpose of sampling is to motivate, clarify or deepen the material
	Select an contextual examples or learning tasks for students

(Lestari et al., 2019)

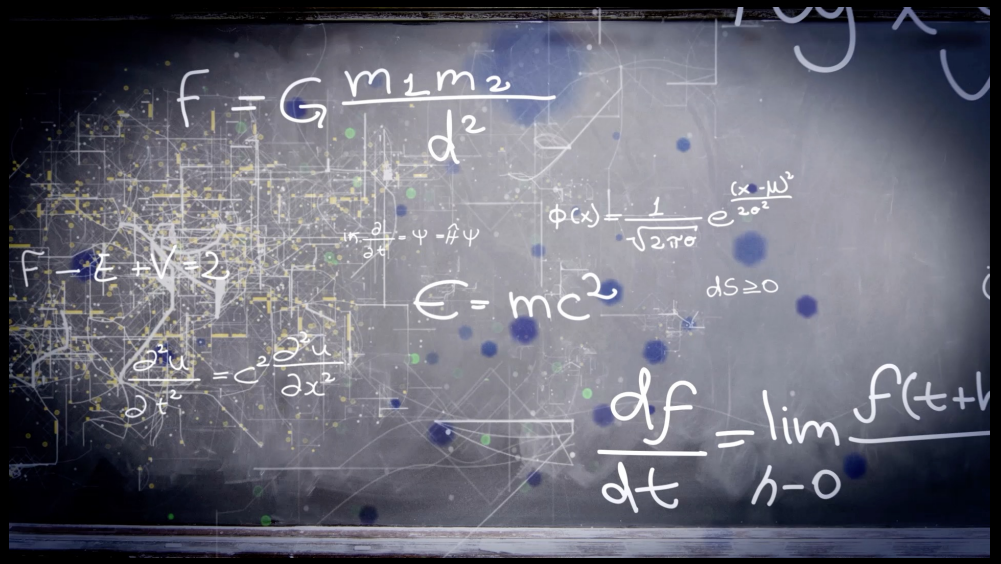
Tasks referred to knowledge of content and teaching

(Lestari et al., 2019)

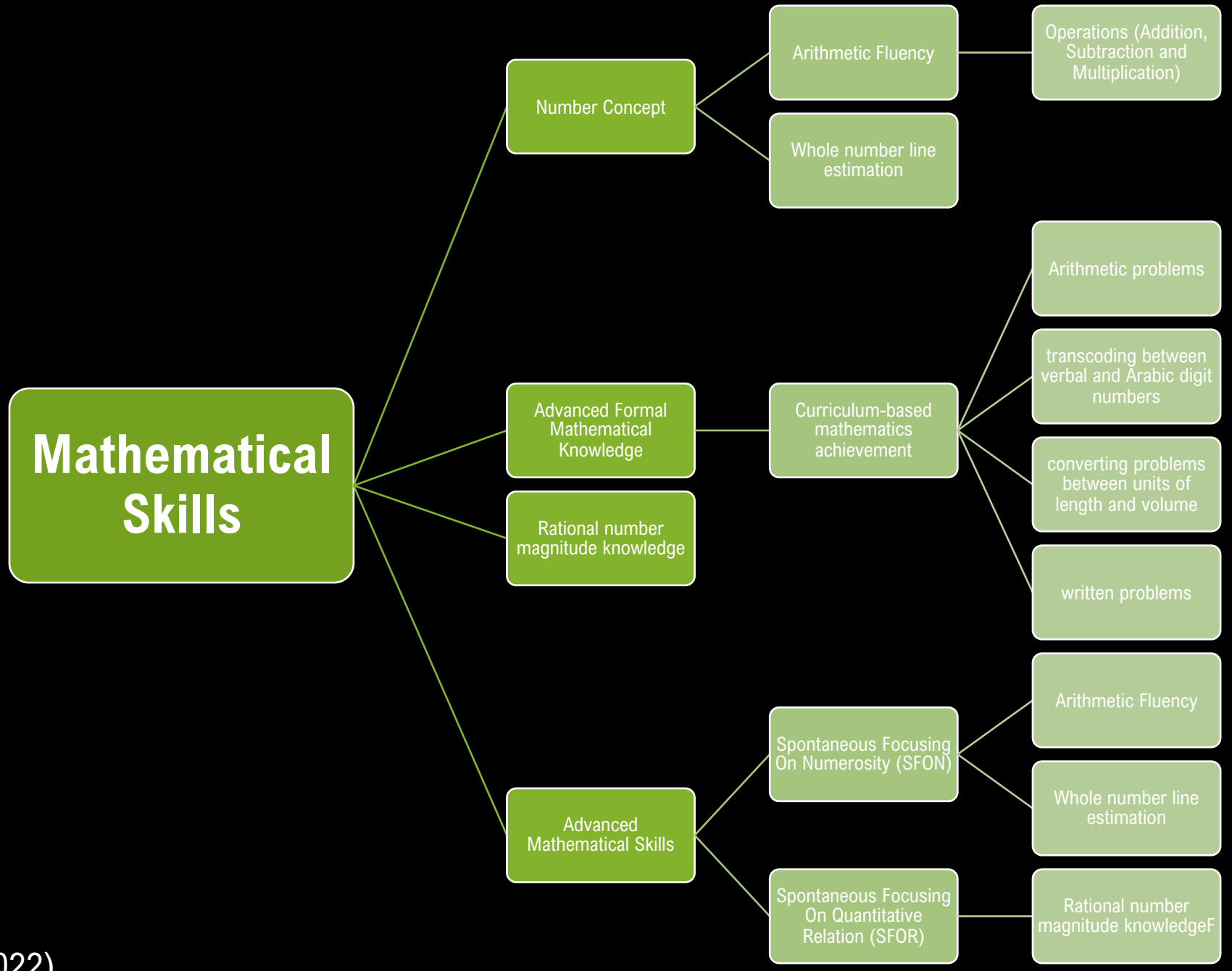
CATEGORIES	INDICATORS
Selection of representation	Know and use representations, analogies, illustrations, and examples that support the material to make it easier for students to understand
	Understand the weaknesses and advantages of using representation in assigning tasks

(Ball et al., 2008)

- Presenting mathematical ideas
- Responding to students' "why" questions
- Finding an example to make a specific mathematical point
- Recognizing what is involved in using a particular representation
- Linking representations to underlying ideas and to other representations
- Connecting a topic being taught to topics from prior or future years
- Explaining mathematical goals and purposes to parents
- Appraising and adapting the mathematical content of textbooks
- Modifying tasks to be either easier or harder
- Evaluating the plausibility of students' claims (often quickly)
- Giving or evaluating mathematical explanations
- Choosing and developing useable definitions
- Using mathematical notation and language and critiquing its use
- Asking productive mathematical questions
- Selecting representations for particular purposes Inspecting equivalencies



Maths skills of students 11 years old



(Halme et al., 2022)

SFON: Spontaneous Focusing on Numerosity

- The spontaneous (i.e. unguided) focusing of attention on exact numerosity and the use of exact numerosity in situations that are not explicitly mathematical
- A child's self-initiated practice of enumeration skills in everyday life
- It supports the development of numeracy skills

(Halme et al., 2022)

SFOR: Spontaneous Focusing on Quantitative Relation

THE SPONTANEOUS RECOGNITION AND USE OF EXACT QUANTITATIVE RELATIONS IN A MATHEMATICALLY UNSPECIFIED SITUATION

IT FACILITATES MATHEMATICAL LEARNING THROUGH SELF-INITIATED PRACTICE WITH QUANTITATIVE RELATIONS IN EVERYDAY SITUATIONS.

IT IS AN IMPORTANT DEVELOPMENTAL CONTRIBUTOR OF RATIONAL NUMBER KNOWLEDGE

(Halme et al., 2022)

Process functions

- tools for developing conceptual fluency
- tools for mathematical exploration
- tools for integrating different mathematical representations
- tools for learning how to learn
- tools for learning problem-solving methods.

Maths Skills of 6th grade students

(Pea, 1987)