

## Content

Lecture 2: Nature of Mathematics Learning

Lecture 3: Theories of teaching mathematics

Lecture 4: Understanding children's development of mathematical concepts

Lecture 5:

Lecture 6: Promoting meaningful early numeracy

Lecture 7: Developing number sense

Lecture 8: Teaching and learning addition and subtraction concepts and processes

Lecture 9: Multiplicative reasoning

Lecture 10: Teaching and learning multiplication and division concepts and processes

Lecture 11: Learning and rational numbers

Lecture 12: Teaching and learning fractions

Lecture 13: Learning about patterns and algebra

Lecture 14: Patterns and structure in mathematics learning

Lecture 15: Learning about measurement

Lecture 16: Approaches to teaching and learning measurement

Lecture 17: Development of spatial and geometric understanding

Lecture 18: Early development of spatial and geometric thinking

Lecture 19: Working mathematically

Lecture 20: Development of statistical reasoning and data exploration in primary school

Lecture 21: Teaching for engagement

Lecture 22: Chance and probability in the primary school

- Discourage thinking
- Isolation
- Negative attitudes
- Discourage

### **Mathematics for children: Challenging children to think mathematically. Weekly Reading**

- Base ten knowledge of place value and using ten as a unit are critical to developing addition and subtraction processes
- Children's early addition, subtraction, multiplication and division knowledge is based fundamentally on the development of counting sequences and arithmetical strategies, along with skills of combining partitioning and patterning
- The important notion of associativity means that children need to combine and partition numbers to construct addition and subtraction facts (addition and subtraction processes)
- A composite unit is a collection or group of individual items that must be viewed as one thing
- The child's ability to use equal groups as composite units
- It is important for students to distinguish the difference between partition and quotient problems
- Partition problems: a group of items to be shared into equal groups where the number of groups is known
- Quotient problems: a group of items shared into equal groups where the number in each group is known but not the number of groups
- Multiplication and division facts can be gradually constructed and derived through increasing counting skills: skip counting and double counting where visible items are gradually replaced by counting and using composite groups, repeated addition and subtraction, and then using multiplication and division more generally as operations
- Lessons such as Equal grouping and using arrays, are great examples to reinforce basic strategies in developing multiplication and division such as coordinating equal groups in rows and columns
- It is important for children to find similarities and differences between number facts by recording and finding patterns and relationships between facts. Making connections is critical to basic fact knowledge
- The transition from counting to mental strategies and automatic number facts is developed through a variety of arithmetical problem-centred situations in conjunction with open-ended problem-solving and number-sense activities.

## Lecture 8: Teaching and learning addition and subtraction concepts and processes

### **Approaches to teaching and learning:**

- **Addition and subtraction**
  - Base ten (has decimal numeral system has ten as its base)
  - Mental computation strategies for computation up to 3 digits
  - Use 100 chart to develop mental strategies
  - Use 'jump and split' method on empty number line for addition and subtraction
  - Use 'equal addends' and/or 'decomposition' for formal subtraction