Critical Thinking in Science

Workshop for Parents

8 Apr 2022 (Mon)

Mindset Change

- From key words… to concept words
- From topics… to thinking tasks
- From information… to inquiry

Primary Science

Syllabus

- https://www.moe.gov.sg/primary/curriculum/syllabus

PSLE Format (2022)

- https://www.seab.gov.sg/home/examinations/psle/psle-formats-examined-in-2022

Curriculum and Assessment Objectives

I. Knowledge with Understanding

II. Application of Knowledge and Process Skills

I. Knowledge with Understanding

- Students should be able to demonstrate knowledge and understanding of scientific facts, concepts and principles.

I. Knowledge with Understanding

The concepts in the Primary Science curriculum are organised and taught under five overarching key themes, namely:

- Diversity
- Cycles
- Systems
- Interactions
- Energy

I. Knowledge with Understanding

The curriculum is further organised into two blocks of learning:

- Lower Block (Primary 3 and 4)
- Upper Block (Primary 5 and 6)

Theme: Diversity

There is a great variety of living and non-living things in the world and we classify things to better understand the world in which we live in.

<u>Topics</u>

- Living Things (P3)
- Materials (P3)

Theme: Cycles

There are repeated patterns of change in nature such as life cycles of living things.

Topics

- Life Cycles (P3)
- Matter (P4)
- Plant Reproduction (P5)
- Water (P5)
- Human Reproduction (P5)

Theme: Systems

A system is a whole consisting of parts that work together to perform a function.

Topics

- Plant Parts (P3)
- Digestive System (P4)
- Plant System (P5)
- Electrical System (P5)
- Human System (P5)
- Cell System (P5) – *Not required for Foundation Science*

Theme: Interactions

There are interactions among Man, living and non-living things in the environment.

Topics

- Magnets (P3)
- Forces (P6)
- Environment (P6)

Theme: Energy

Energy makes changes and movement possible in everyday life.

<u>Topics</u>

- Light (P4)
- Heat (P4)
- Photosynthesis (P5)
- Energy Conversion (P6) – *not required for FSC*

Curriculum and Assessment Objectives

I. Knowledge with Understanding

II. Application of Knowledge and Process Skills

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Students should be able to:

a. **apply scientific facts, concepts and principles to new situations.**

b. interpret information (including pictorial, tabular and graphical) and investigate using one or a combination of the following process skills:

- Inferring
- Predicting
- Analysing
- Evaluating
- Generating possibilities
- Formulating hypothesis
- Communicating

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- **Communicating**

II. Application of Knowledge and Process Skills

Communicating

- This is the skill of transmitting and receiving information presented in various forms – written, verbal, pictorial, tabular or graphical.

II. Application of Knowledge and Process Skills

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b. interpret information (including pictorial, tabular and graphical) and **investigate using one or a combination of the following process skills:**

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- **Predicting**
- **Analysing**
- **Evaluating**
- **Generating possibilities**
- **Formulating hypothesis**
- Communicating

II. Application of Knowledge and Process Skills

Inferring

- This is the skill of interpreting or explaining observations or pieces of data or information.

II. Application of Knowledge and Process Skills

Predicting

- This is the skill of assessing the likelihood of an outcome based on prior knowledge of how things usually turn out.

II. Application of Knowledge and Process Skills

Analysing

- This is the skill of identifying the parts of objects, information or processes, and the patterns and relationships between these parts.

II. Application of Knowledge and Process Skills

Evaluating

- This is the skill of assessing the reasonableness, accuracy and quality of information, processes or ideas. This is also the skill of assessing the quality and feasibility of objects.

II. Application of Knowledge and Process Skills

Generating possibilities

- This is the skill of exploring all the alternatives, possibilities and choices beyond the obvious or preferred one.

II. Application of Knowledge and Process Skills

Formulating hypothesis

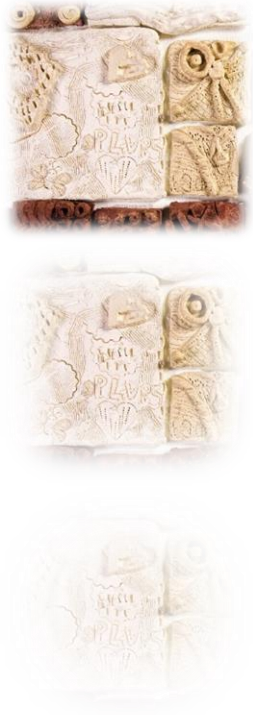
- This is the skill of making a general explanation for a related set of observations or events. It is an extension of inferring.

Thinking Tasks

- State
- Describe
- Compare
- Relate
- Explain
- Infer

State

- To give a concise answer with little or no supporting argument



Describe

- To state in words (using diagrams where appropriate) the main points

Compare

- To identify similarities and differences between objects, concepts or processes

<u>Similarities</u>

"**Both** birds and insects lay eggs."

<u>Differences</u>

"Birds have 2 legs, **but** insects have 6 legs."

Relate

- To identify and explain the relationships between objects, concepts or processes

"**As** the *[changed variable]* **increases**,

the *[observed variable]*

increases/decreases/remains the same."

Explain (Cause & Effect)

- To explain new situations using scientific facts, concepts and principles

Cause => Effect

Infer (CER)

- To draw a conclusion based on observations

Claim – conclusion

Evidence – observations in pictures, tables, graphs

Reasoning – scientific concept