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BEYOND FACTS
Teaching Geography for Conceptual Understanding

Ms Lim Puay Yin
Master Teacher/Geography
Academy of Singapore Teachers
Ministry of Education
Lim_puay_yin@moe.edu.sg

Ms Lian Lay Cheng
Senior Teacher/Geography
Singapore Sports School
geogllc@gmail.com
Our belief

• When *teachers teach for conceptual understanding*, they **deepen** the students’ understanding of how seemingly disparate facts are interconnected to make sense.

• It begins with the teacher **mapping** the concepts....

• It is not enough to understand Geography’s key concepts, it is important to *connect* the concepts to develop **big ideas** that show a deeper understanding of Geography as a discipline.
What’s on today?

• Part 1 - How does one map a unit to teach for conceptual understanding?
• Part 2 - What are concepts? How do concepts connect to form big ideas?
• Part 3 - What does a lesson that teaches for conceptual understanding look like? In what ways is it different from lessons that teach for factual understanding?
Part 1 - How does one map a unit to teach for conceptual understanding?

Looking at the content of a unit,

1. What concepts are essential to help our students get the big ideas?
2. What are the big ideas we would like our students to learn as they study a topic?
Viewing the Rainforest as a Resource

“a natural resource has value in the eyes of the users, and its long-term value is appreciated when people adopt a sustainable view of the use of it.”

Photos by Lim Puay Yin
Approaching a Geography Issue like Deforestation

*Teachers need to unpack the curriculum*

1. Identify the key concepts, e.g. natural resource.

2. Unpack the big idea about the concept, e.g. “a natural resource has *value* in the eyes of the users, and its long-term value is appreciated when people adopt a sustainable view of the use of it.”

3. Re-sequence and re-frame the syllabus to centre on the concept of the tropical rainforest as a resource.

4. Understand why deforestation has become an issue.

5. Help students to reach the realisation that because of the way humans extract the resource, it has become unsustainable because the rate of extraction is *faster* than the replenishment of the resource.
Approaching a Geography Issue like Deforestation

**Teachers need to unpack the curriculum**

5. Delve into why people are extracting the resource—People’s view that it is important to gain immediate value from rainforest rather than long term **sustainability**.

6. Help students appreciate the structure of the rainforest and the complex ecosystem with a wide biodiversity: help students understand that the Tropical Rainforest ecosystem is **an interconnected system** where changes happening in one area will affect others around it, e.g. a highway cutting across a rainforest has wide-reaching consequences on the biodiversity of the area.
Eco-Link along the Bukit Timah Expressway


Photos by Lim Puay Yin
What are some implications for Unit & Lesson Planning?

• Sequencing of the lessons—may not always follow the textbook

• Begin with the big idea of what the issue is all about when planning the unit of lessons

• Expand the understanding of the concept throughout the lesson unit; constantly revisit the big ideas and deepen the understanding.

• Students need to use seemingly disparate facts in a inter-connected manner to construct their understanding.
Part 2 - What are concepts? How do concepts connect to form big ideas?
What is a concept?

- An organising idea;
- A mental construct that is...
  - Timeless
  - Universal
    - Represented by one or two words, or a short phrase
  - Abstract to different degrees (macro to micro)
  - Examples share common attributes
Concepts in Singapore Lower-Secondary Geography: Issue of Tropical Rainforest: How can we save the rainforest?

Main Terms/Content Concepts:
- Tropical rainforest
- Canopy
- Emergent
- Undergrowth
- Buttress root
- Evergreen
- Drip-tip leaves
- Water catchment
- Green Lungs of the Earth
- Flora
- Fauna
- Timber wood
- Medical application
- Deforestation

Geographical Concepts:
- Space
- Place
- Scale
- Environment
The Structure of Knowledge

Generalisations/ Understandings: *(Students understand that...)* The characteristics of the rainforest reflect its adaptability to the equatorial climate.

**Concepts:**

- CLIMATE
- ADAPTATION
- CHARACTERISTICS

**Topic:** Tropical Rainforest Characteristics

**Examples of facts:**

- Tropical Rainforests are located in areas with high annual rainfall of more than 2000 mm and high mean annual temperatures of about 27 deg celcius.
- There are many varieties of plant species found in the rainforest.
- Plants adapt to the hot and wet environment, e.g. drip tip leaves, waxy surfaces of leaves, etc.
Unit Planner

Big Idea: Saving the rainforests is saving ourselves!

Managing deforestation is necessary to sustain the quality of life for all living organisms.

Environment
- Temperature
- Rainfall
- Humidity
- Clouds
- Sunlight

Tropical Rainforests
- Biodiversity
- Structure
- Adaptation
- Flora and fauna

Adaptation
- Buttress roots
- Drip tip leaves
- Epiphytes
- Saprophytes
- Lianas

Distribution
- Equatorial climate
- River systems

Water Catchment
- Interception
- Surface runoff
- Sedimentation
- Dry seasons
- Transpiration
- Soil erosion
- Flooding

Enhanced Greenhouse Effect
- Radiation
- Global warming
- Atmosphere
- Greenhouse gases

Economic Resource
- Agriculture
- Forestry
- Mining
- Cattle ranching
- Urban development
- Transport

Indigenous People
- Survival
- Shifting cultivation
- Displacement
- Cultural identity
- Migration

Management
- Conservation
- Reforestation
- Controlled logging
- Public education

Unit Title
Deforestation: Why are the rainforests worth saving?

Conceptual Lens: Interconnectedness

Unit Overview
Have you ever wondered...
- Why are the everyday things we use and buy connected to the loss of the rainforest?
- Why are the world’s rainforests shrinking?
- Why is the earth getting warmer?
- Why are urban areas constantly being flooded?
- Why is balancing our demand for resources important to our own survival?
- Why it is important to think long-term rather than short-term?
- What can you do to save the rainforests?

In this unit we will find answers to these questions and more, so put on your thinking caps!
Use of Conceptual Lenses on Unit on Issue of Deforestation

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<th>Space</th>
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<td>Resource</td>
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<th>Some useful Conceptual Lenses</th>
<th>Content Concepts (examples)</th>
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<td>Natural Vegetation, Natural Resource, Structure, Flora &amp; Fauna, Biodiversity, Stakeholders, etc.</td>
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| Essential Questions | Why are the rainforests worth saving? |

<table>
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<th>Big Ideas or Understanding Statements</th>
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<tr>
<td>The rainforest is a fragile and complex ecosystem where humans and flora and fauna exist in an interdependent relationship. The value of a natural resource depends on the worth that people place on it. It can change depending on the context. Humans rely on the rainforests, which makes up the largest remaining stands of natural forests, for life on earth: oxygen, water and many natural resources (interconnectedness). Saving the rainforests is saving ourselves. Deforestation occurs when there is an imbalance between the fast rate at which forests are being depleted because of increasing demand for forests as a resource compared to the slow natural rate of forest regrowth (supply). Even though deforestation is happening at selected places on earth, its effects are felt worldwide because we live in an interconnected world where physical and human processes are interacting. Managing deforestation, like other complex issues, require understanding the perspectives of the various stakeholders involved, and tackling the root causes of the problem. Discovering and studying the biodiversity of the rainforests is important for appreciating and understanding how to save the rainforests. Only when there is sustainable use of resources will there be enough resources for all.</td>
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## Some Conceptual Lenses useful for learning Geography

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<th>Adaptation</th>
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<td>Sustainability</td>
<td>System</td>
<td>Technology</td>
<td>Variations</td>
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Don’t throw away facts, but also organise learning around connected concepts

• Experts’ knowledge is connected and organised around important concepts;

• It is “conditionalised” to specify the contexts in which it is applicable;

• It supports understanding and transfer (to other contexts) rather than only the ability to remember.

Part 3 - What does a lesson that teaches for conceptual understanding look like? In what ways is it different from lessons that teach for factual understanding?
A Map to Guide the Students’ Learning

When beginning the initial writing phase of a unit, I always begin with a concept map. I first make one for myself, with paper and pencil.... Once the map is complete, I then make the same map again using large chart paper and coloured markers to display for my students at the beginning of the unit. This allows them to see where we are heading throughout the unit and make connections between concepts and across content areas.

....they will have a clear map to guide them. I refer to the map throughout the unit and so do my students...we go through each part of the map to form a discussion of how we covered each concept. The discussion always ends with students having moments of self-discovery about what they accomplished. As a result, they show greater confidence in the content they have mastered. Teacher quoted in Hardiman (2012). p. 83.
How might we teach for conceptual understanding?

**DEDUCTIVE APPROACH**

Conceptual understanding is formulated by the teacher at the beginning of the lesson.

**INDUCTIVE APPROACH**

Conceptual understanding is formulated by students at the end of the lesson.
How does teaching for conceptual understanding look like?

• Let’s look at Sample Lessons A & B.
• How do the two lessons attempt to teach for conceptual understanding?
3 Strategies for Concept Learning (Parker, 2009)

1. **Concept formation** – Teacher provides examples. Students note differences and similarities. Teacher summarises the critical attributes of a concept. Teacher asks students to label and classify. (http://teachinghistory.org/teaching-materials/teaching-guides/25184. Downloaded 3 May 2016.)

2. **Listing, Grouping and Labeling** – Teacher asks students to list, group and label concepts.

3. **Concept attainment** – Teacher identifies critical attributes of a concept and then helps them to work with examples and non-examples).

“...All rely on helping children experience multiple examples of the concept to be learned. This is, in a nutshell, the key to concept teaching and learning.”

Parker (1997:196)
How do we check for conceptual understanding?

- Let’s hear it from the students!
  - Concept-Mapping
  - Annotated Drawings
  - Card-sort Activity
  - Student Reflections
  - Frayer’s Model
  - Exit Cards
  - Performance Tasks
Concept-Mapping through Padlet

Tropical Rainforests
What comes to mind when you think of 'tropical rainforests'?

World distribution
2. Where are tropical rainforests found?

Amazon
Southeast Asia
Congo Basin
Many types of plants

Equatorial Climate

Flora & fauna

High humidity
Cloud cover
High temperatures

Characteristics

Tall and straight tree trunks

Buttress Roots

Emergent layer

Canopy

Epiphytes

Structure
Annotated Drawings
Examining student work

1. With the help of specific examples, explain how the natural vegetation in a tropical rainforest adapts to the humid tropical climate.

Different plants have different adaptations. Only about 2% of sunlight reaches the forest floor. Thus, plants grow large leaves to take in as much sunlight as possible. Some of them have dark green leaves, which act as solar panels to trap sunlight. The humid climate means the plants have an abundance of water. Their roots hence do not need to spread out much. However, in layers like the canopy and emergent layers, it is not very humid. This is because wind blows away most of the water vapour in the air. Also, since there are few trees to shade them from sunlight, a lot of water is lost via transpiration. They thus have small leaves, to minimise water loss via transpiration, and also have large roots to absorb as much water as possible.
In conclusion

• When teachers teach for conceptual understanding, they **deepen** the students’ understanding of how facts and concepts are **interconnected** to make sense.

• It is not enough to understand Geography’s key concepts, it is important to help students connect the key concepts with content concepts and conceptual lenses to develop **big ideas** that show a deeper understanding of Geography as a subject.

• Unless teachers understand and share the belief & philosophy behind the inquiry approach, there will not be critical thinking in the classroom.
Learning Geography through Inquiry

The ability to think cannot be “given” by teachers to students. Effective thinking depends on the richness of content, the processes used, and the initial assistance provided in the development of such processes.

Taba, Durkin, Fraenkel, & McNaughton, 1971, p. 11
References


Some slides are adapted from materials from Lynn Erickson’s Concept-Based Curriculum and Instruction Trainers’ Workshop 2012 (Ms Lim Puay Yin is a certified CBCI trainer).
Books useful for tools for how to teach for conceptual understanding