History of Curriculum Reform in Science Education across East-Asian Regions

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Quo Vadis, Scientia Erudio?

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Collaborative Proposal: Group A

Before starting…

Principle A: integrate all of our backgrounds and careers!

Principle B: it should be able to done by ourselves!

Principle C: make the world better!

Name	Su(Korea)	Kaz(Japan)	Wu(China)	Ivy(Taiwan)	Joe(Korea)
Major	Physics	Biology	Physics	Biology	Physics
Occupation	Staff of a institute	Student	Student	Primary teacher	Student
Research Topic	Sci. museum	Curriculum	Sci. inquiry	Sci. writing	Internet (SSI)
Basic Idea	Sci. creativity	Role of sci.	Affective domain	NOS Sci. writing	SSI

In this study…

- The significance of the topic
- Research questions
- Theoretical background
- Research method
- Expected result and conclusion

Research concerning Science Curriculum

1. To understand the key to fulfill the goal of science education
2. To cope with the shared issues in East Asian regions
3. To concentrate on the blueprint of national standards.
4. To explain the results surrounding PISA, TIMSS and other international comparative studies

Research questions

1. What features have been shown historically in curriculum reform across the regions?

Learning of science: What concepts have been tackled?

Learning about science: How NOS have been reflected?

Learning to do science: How scientific literacy have been considered?

Reflection of culture: What cultural components have been described?

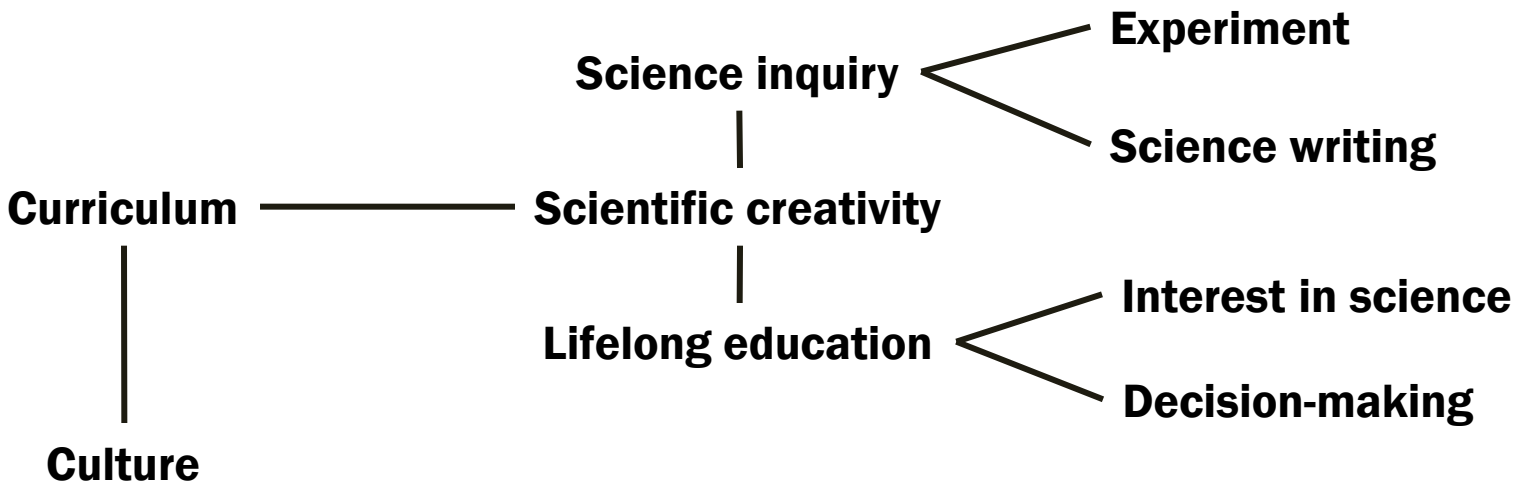
2. What encouraged to renovate the curriculum?

Social context: What features of social context have affected on curriculum?

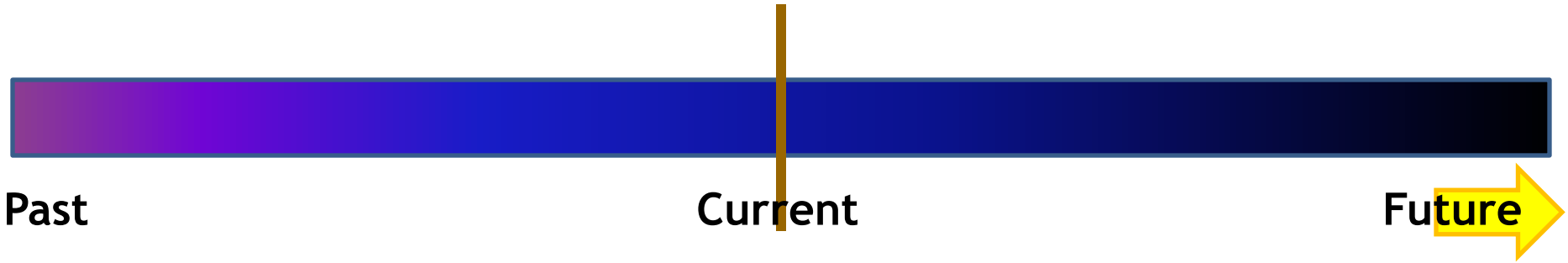
Background philosophy: What features of background have affected on curriculum?

Intention of government: What features of intention of government have affected curriculum?

How we get this idea?



Eagle's eye: the point of view



"History is continuous discourse of the past and the current."

Edward Hallet Karr

The wind blows wherever it pleases. You hear its sound, but you cannot tell where it comes from or where it is going...

John 3:8 in NIV

Zooming in/out: The photography of science curriculum

Bigger Background:
paradigm in the contemporary world

Background: socio-cultural circumstance

Foreground: intended curriculum

Zooming in/out: The photography of science curriculum

1. Historical change in one region

2. Bridging different regions

3. Comparing the regions centering on US

The categorization of curricula

Three kinds of curriculum by TIMSS

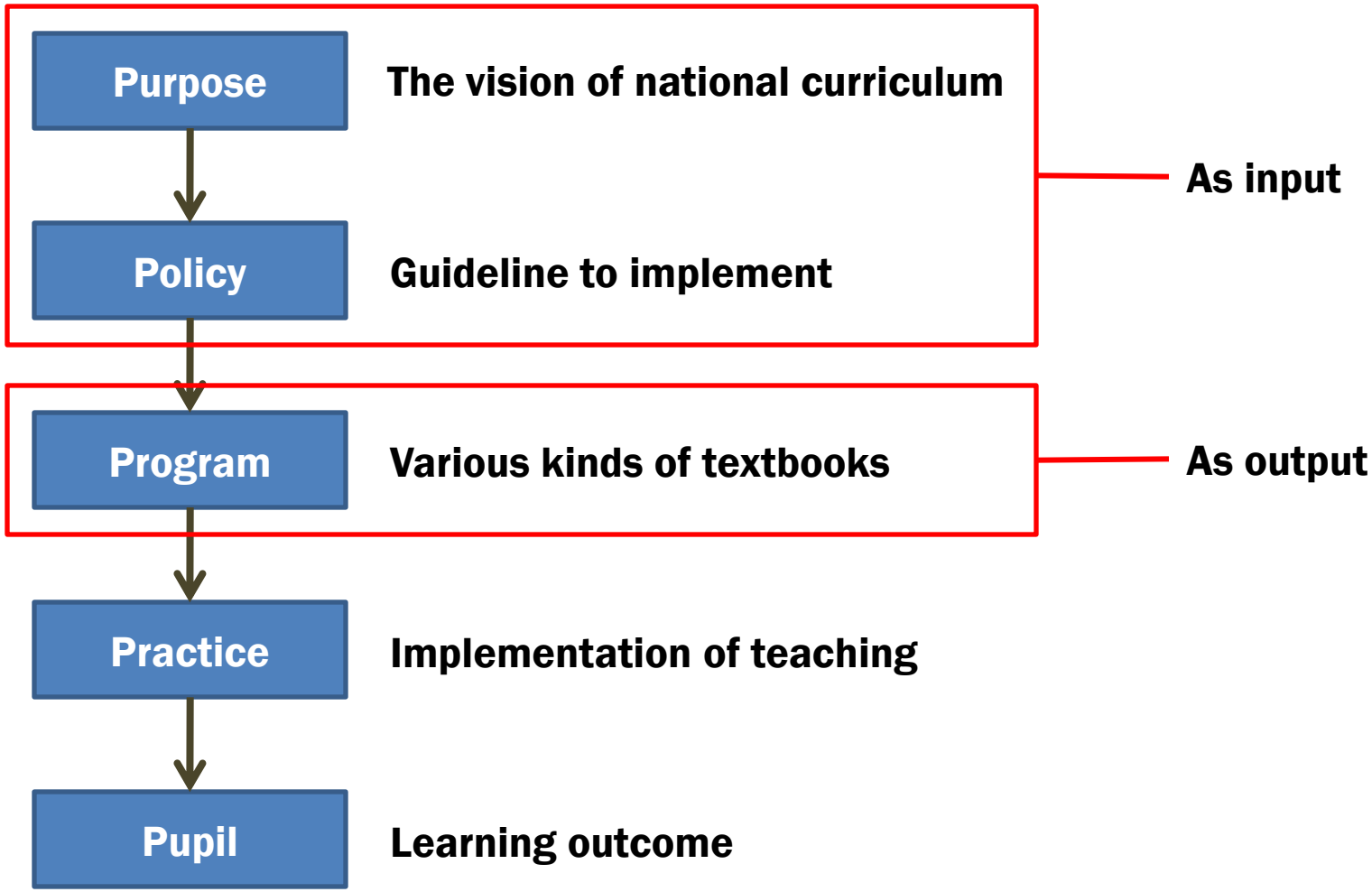
- **Intended curriculum (The Aim of Science)**
- **Implemented curriculum (Science Teaching)**
- **Attained curriculum (Learning outcome)**

Three kinds of curriculum by Aikenhead (2005)

- **Intended curriculum**
- **Taught curriculum**
- **Learned curriculum**

The focus of this study

The Different Level of Science Curriculum (Bybee, 1998)



The Photography of Science Curriculum

Bigger Background:
paradigm in the contemporary world

Background: socio-cultural circumstance

Foreground: intended curriculum

The Photography of Science Curriculum

Foreground: historical change of curriculum components

Relevant to whom? Relevant to what? (Mayoh & Knutton, 1997)

Who decides what is relevant (Fensham, 2000)

Teacher, science educator, scientists?

Wish-they-knew science	scientist
Need-to-know science	ordinary people
Functional science	S & T worker
Enticed-to-know science	media
Have-cause-to-know science	expert in SC
Personal-curiosity science	student
Science-as-culture	community

The Photography of Science Curriculum

Foreground: historical change of curriculum components

Relevant to whom? Relevant to what? (Mayoh & Knutton, 1997)

Who decides what is relevant (Fensham, 2000)

Introduced curriculum

Hurd (1970, 1997)

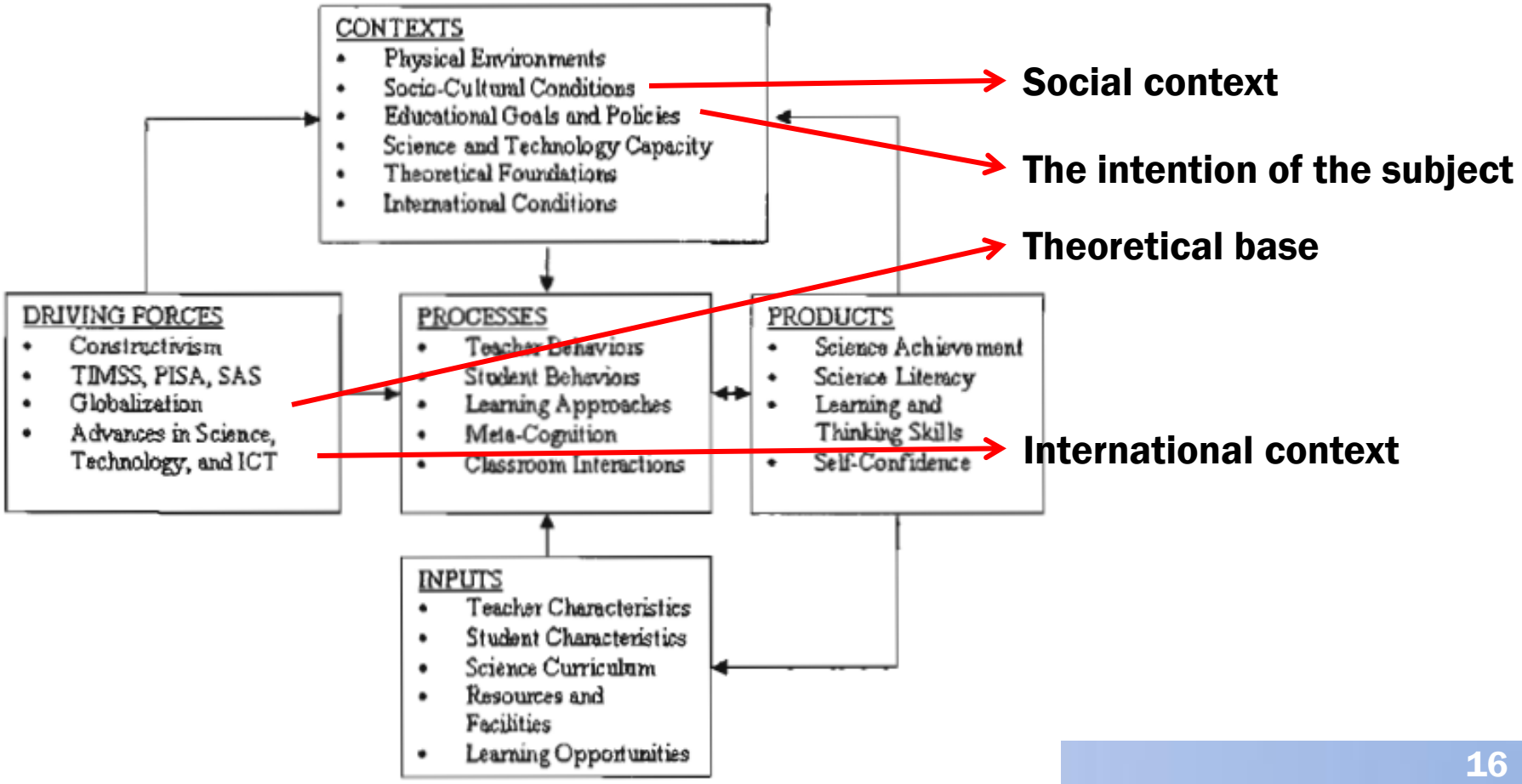
Learning of science	concept
Learning about science	NOS
Learning to do science	Scientific literacy
Culture in science	culture

Wallace & Lauden (1998)
Science as disciplinary, relevant and imperfect knowledge

The Photography of Science Curriculum

Background: driving force to curriculum reform

Guo (2007) proposed a model for school-based learning

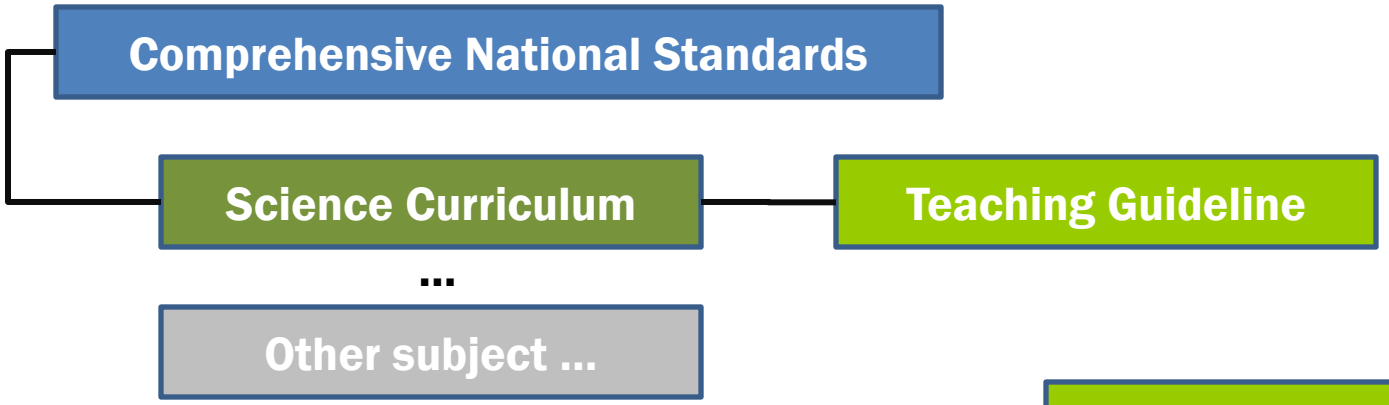


Research design

Epistemology: Interpretive study

Data to be analyzed

1. Official Documents

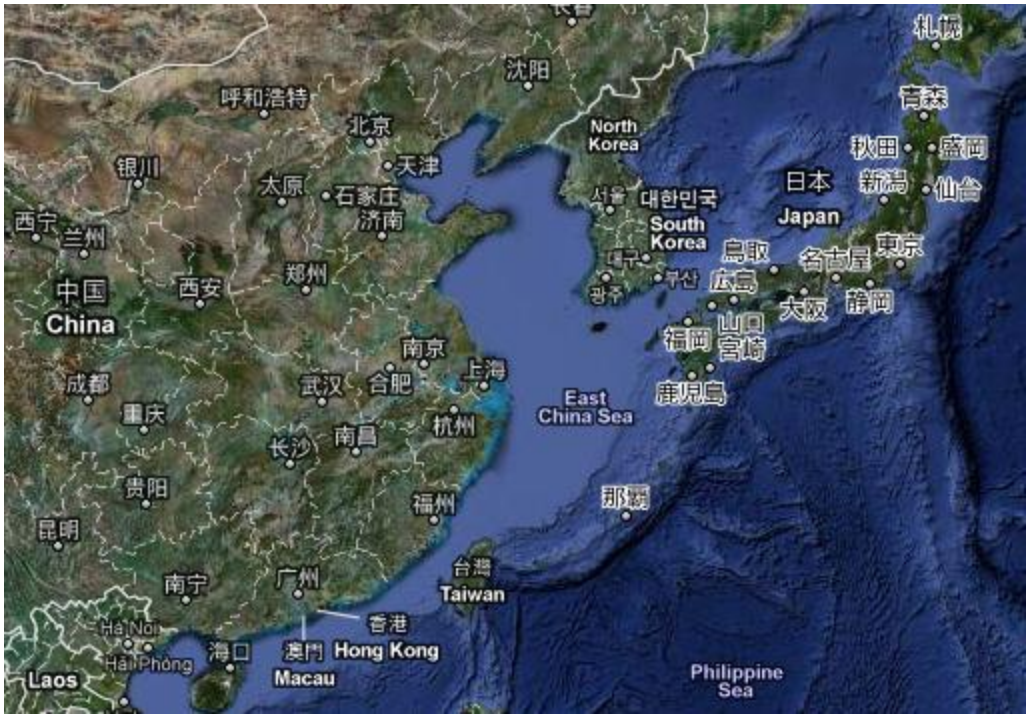


2. Related literature

Research design

The range of regions:

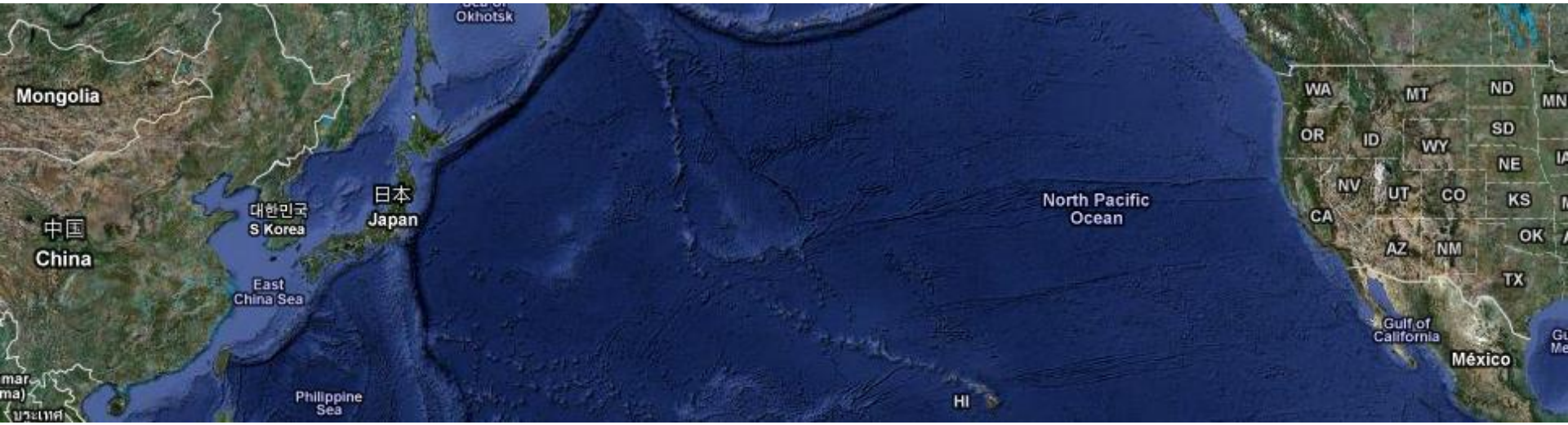
Among East-Asian Regions: China mainland, Hong Kong, Japan, Korea and Taiwan



Research design

The range of regions:

Between the East and the West: **East-Asian regions and the United States**



Research design

The way of interpretation: Content Analysis

Who? The professional Area in which the developer contributed

What? As an output

Learning of science

Learning about science

Learning to do science (scientific literacy)

Culture in science

Research design

The way of interpretation: Content Analysis

Who? The professional Area in which the developer contributed

What? As an output

- **Learning of science**
- **Learning about science**
- **Learning to do science (scientific literacy)**

Culture in science

What? As an input

The aim of the government

Contemporary pedagogical ideology

Social background as a circumstance

Research design

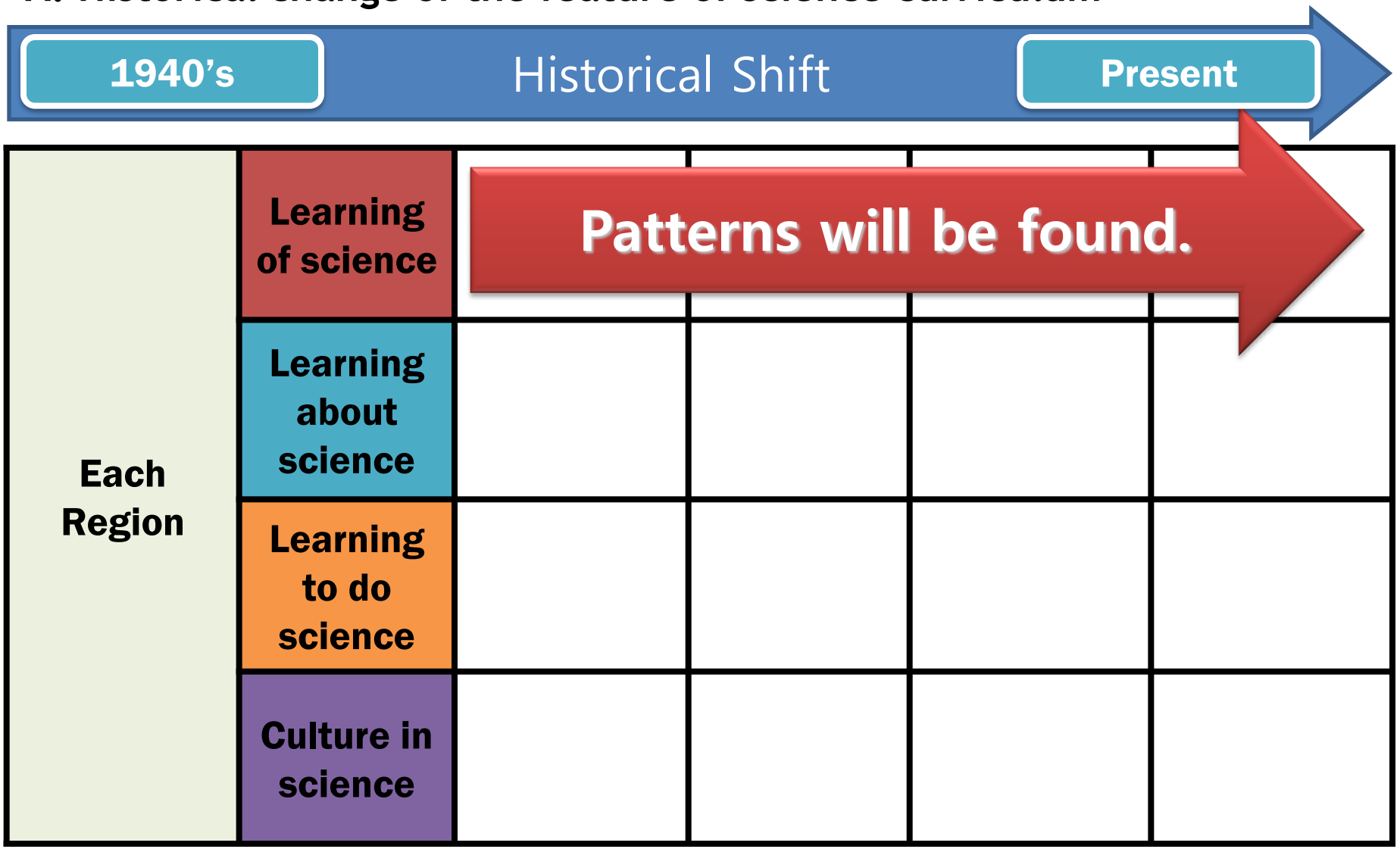
The way of interpretation: Content Analysis & Semi-Structured Interview

Who? Executive staffs, Science educators and Curriculum experts

interview content:

- **Social context**
  e.g. how would social context effect on science curriculum?
- **background of Philosophy**
  e.g. what would background of Philosophy influence on science curriculum?
- **intention of government**
  e.g. how did intention of government make science curriculum change?

A. Historical change of the feature of science curriculum



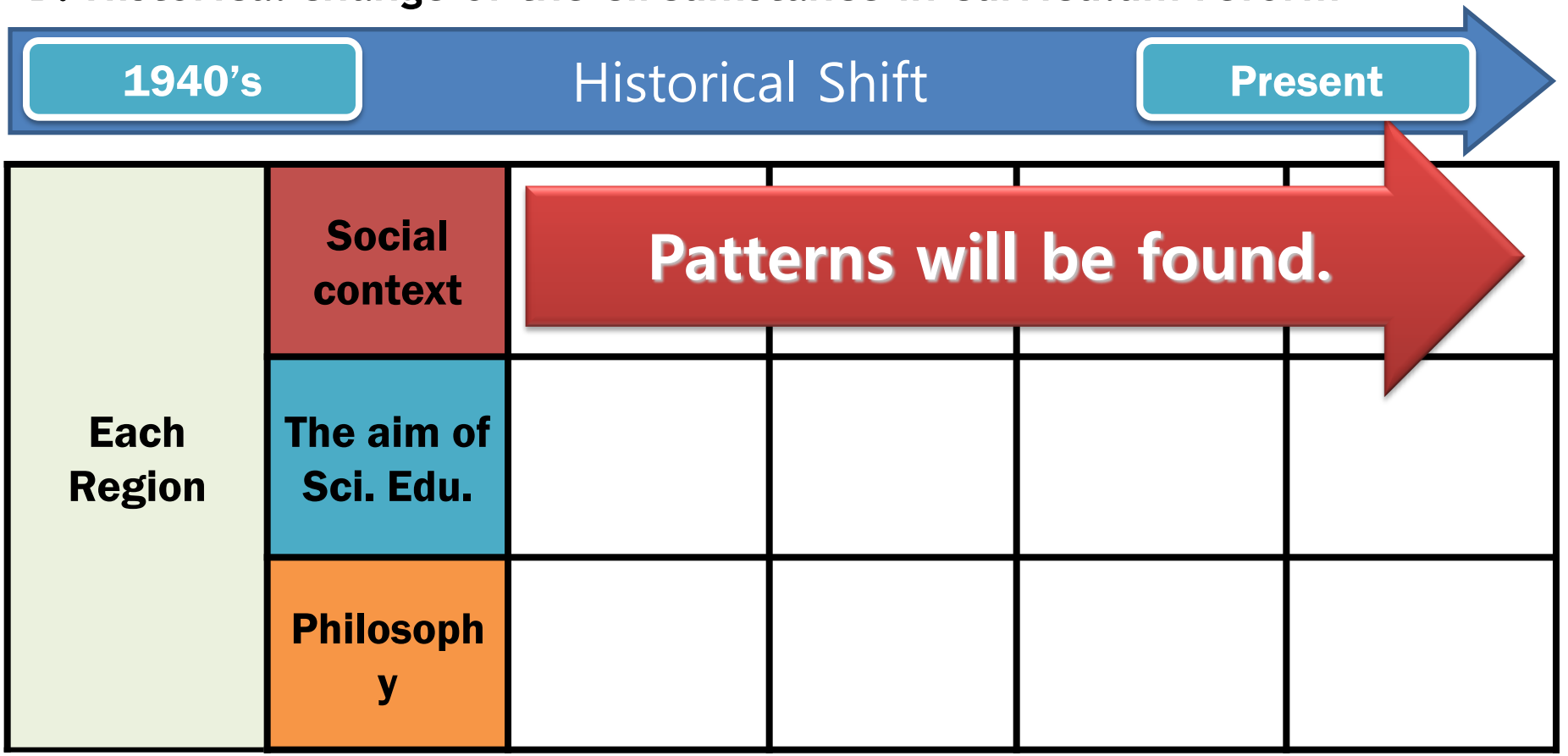
A. Historical change of the feature of science curriculum

1940's — Historical Shift → Present

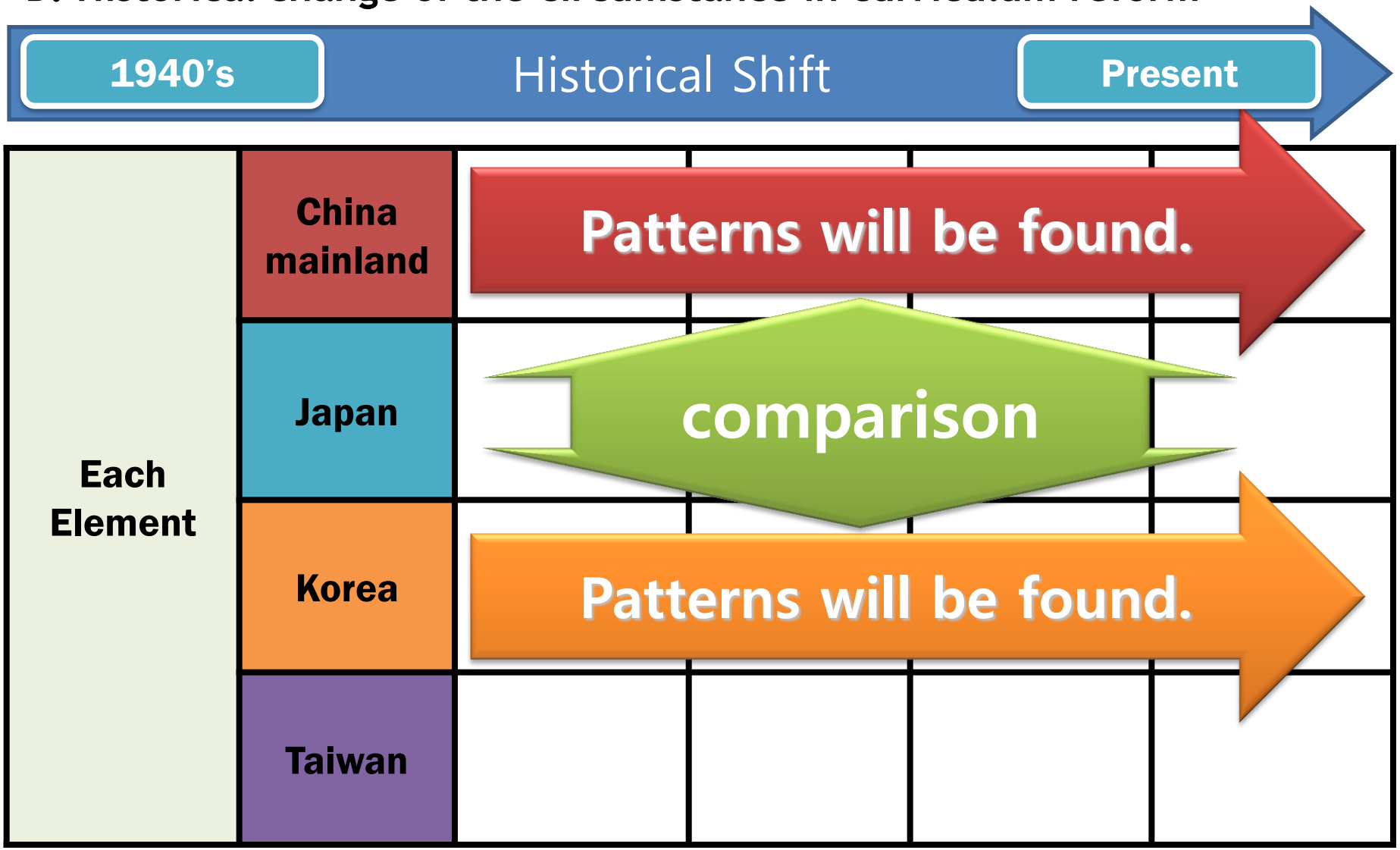
Each Region	Learning of science	Particles, Life, Energy
	Learning about science	A way of knowing about diversity and pattern i n natural world and organisms.
	Learning to do science	
	Culture in science	

A. Historical change of the feature of science curriculum

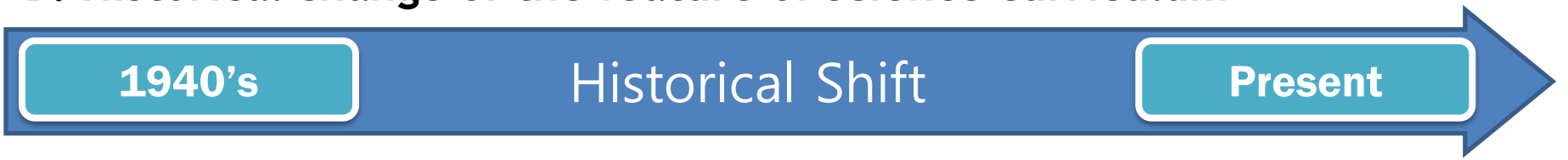
B. Historical change of the circumstance in curriculum reform



B. Historical change of the circumstance in curriculum reform



B. Historical change of the feature of science curriculum



Region	Background philosophy of Science Education				
China	Focus on knowledge (1949-1978)	Knowledge and ability of problem solving (1978-2000)			Knowledge and competency and affect (2000-2010}
Korea	Keep concepts to develop S&T (1964-1973)	Inquiry-based (1974-1981)	"Science for all" STS (1988-1992)	Globalization (1993-2000)	Scientific Literacy (2008-2009)

C. The relationship between social background and the curriculum

1940's → Historical Shift → Present

The circumstance of the curriculum

Each Region	Learning of science				
	Learning about science				
	Learning to do science				
	Culture in science				

D. The relationship between the East and the West in curriculum reform

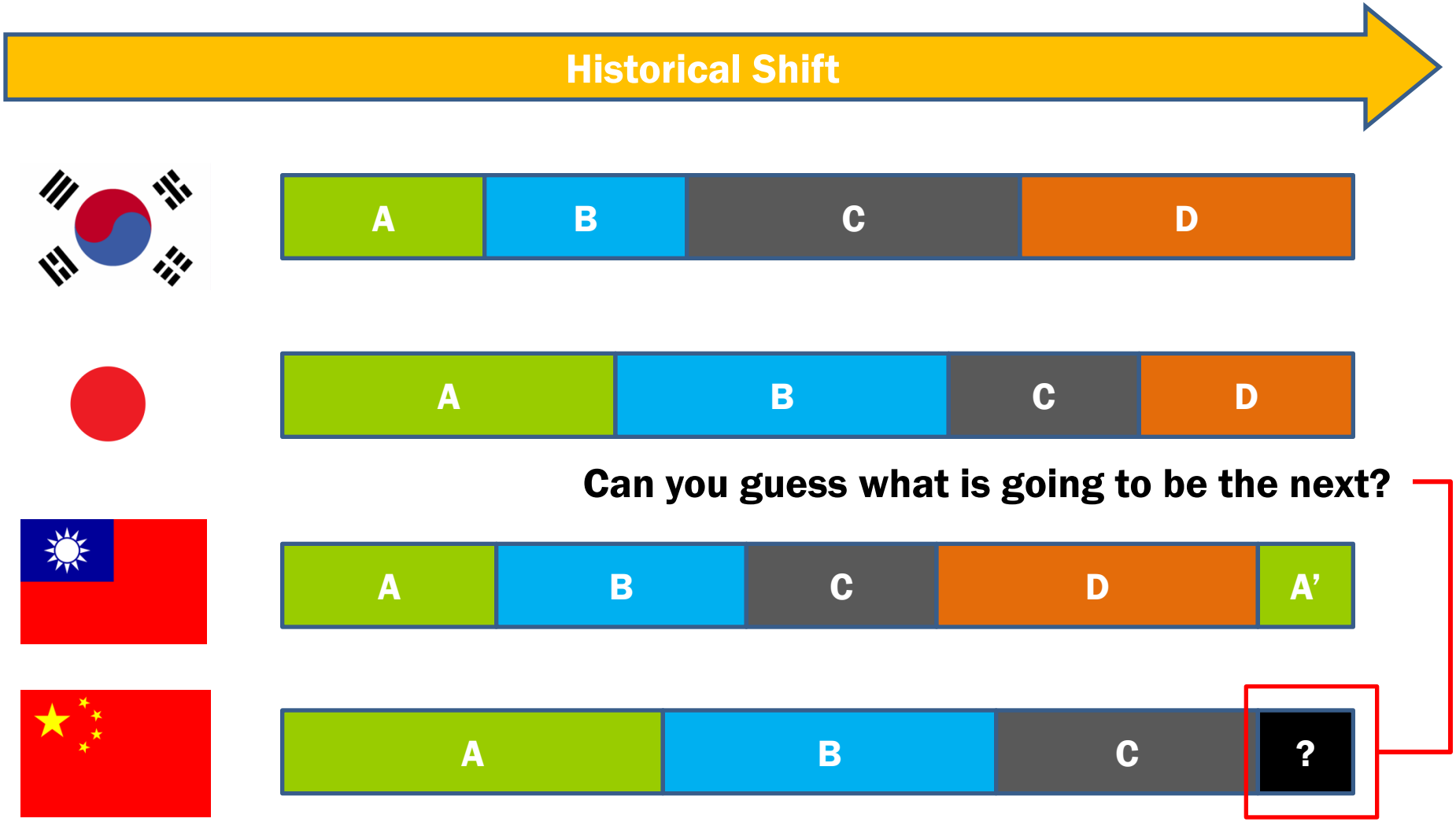
1940's — Historical Shift — Present

The change of national curriculum in US

comparison

China mainland				
Japan				
Korea				
Taiwan				

The Pattern shows…



Across the regions,

There will be some commonalities and difficulties in terms of the curriculum and its background. Especially, repetitive pattern shown in the regions can make us predict what problem will happen in the future and thereby it is helpful to find out how to cope with the issues.

Considering the macroscopic level,

We can understand how the western philosophy of science has influenced our system. However, the accordance of our agenda with western (international) one may not indicate the quality of science curriculum.

Region of Eastern Asia may have suffered similar problems. We can cooperate to resolve the shared problems to get to breakthrough in science education.

The proximity of each region with respect to culture and geography helps us understand what we have done, what we are standing and the next phase to be reached.

THANK YOU