





Exemplar for curriculum development in
the industrial revolution IV
An introductory overviews for what shall we think?

Project Overseer: Masami Isoda, Prof/PhD
Director of Center for Research on International Cooperation in Educational Development
University of Tsukuba, Japan.



Contents:

- 0) What is Exemplar for Curriculum?
- 1) What is going on in Industrial Revolution IV?
In the case of Japan
- 2) What is necessary as for Curriculum Frame Work?
In the case of SEA-BES CCRLS (ASEAN Standards for Math and Science)
- 3) Some Exemplar

筑波大学 University of Tsukuba

What is the exemplar in education?

(Origin: German Didactics by Wagenschein introduced by Otaka 1996)

Teaching Material = Content + Objective in the curriculum framework and sequence (Isoda, 2014)

Exemplar: Preferring most basic and essential example from various existed aims and materials, and explore and learn it deeply, instead of learning various content.

French Didactics in Math Education (Chevallard, 2015): Anthropological Theory of Didactics, Questioning the World, Study and Research Paths

APEG

筑波大学 University of Tsukuba

What is going on in Industrial Revolution IV?

Japan is a leading country of Industrial Revolution IV?
Why?

Society 5.0 = Most Aging Society + Industrial Revolution IV

APEG

筑波大学 University of Tsukuba

At the year 2030, 49 % of labors become the task for AI and Robots and so on. (Nomura Research Institution)

APEC

	>90%			10%>
Cashier 99.7%	Supermarket clerk 99.2 %	CPA 85.9%	Glasses technical salesperson 51.7%	Barber 1.2%
Bus Driver 99.7%	Hotel room clerk 98.7%	Judicial scrivener 78.6%	Painter 5.2%	Industrial designer 1.0%
Ordinary officer 99.7%	Delivery courier 98.6 %	Securities agent 69.6%	Mathematician 4.4%	Announcer 0.7%
Bank teller 99.4%	Security guard 97.8%	Translator 67.1%	Novelist 2.4%	Internist 0.6%
Warehouse worker 99.4%	Machine assembly 91.6%	Real estate salesperson 52.7%	Nurse 1.2%	SME diagnostician 0.2%

筑波大学 University of Tsukuba

What shall we do? (NHK)

Hotel room clerk 98.7%

APEC



栗原 望

Alternate the job to the tasks for AI, and then find the new services which can be provided by human.

Establishment of Human Relationship is the key!

↑ 2:40

筑波大学 University of Tsukuba

What shall we do?
Let's alternate the job which can be done by AI! (NHK)

APEC


Hotel room clerk 98.7%

- Alternate the job to the tasks for AI, and then find the new services which can be provided by human.
- Establishment of Human Relationship is the key!

Real estate salesperson 52.7%

- Find the essential human job under searching the needs of customers.
- We should re-find the significance of ourselves through the new creation based on the human necessity.

Glasses technical salesperson 51.7%



- Salary up if Salesperson is the influencer.
- Not necessary sales talk
- Connectivity using SNS is the human competency

筑波大学 University of Tsukuba

What is necessary as for human competency.
Stereo Type Arguments (NHK)

APEC

Develop Humanity	Develop Digital Competency
• Creativity	• Knowing what AI can and cannot
• Hospitality	
• Management	
Develop Humanity <u>Without computer</u>	Develop Digital Competency <u>with AI</u>

筑波大学 University of Tsukuba

AI vs Education: Current Ability of AI

The Project: Can AI pass the Univ. of Tokyo Exam? (2011-)

APEC

Deviation Value of National Univ.in Education Major:

- 79 The Univ. of Tokyo
- 77 Kyoto Univ.
- 71 Nagoya Univ.
- 70 The Univ. of Tsukuba
- 68 Hokkaido Univ., Tohoku Univ.

62 Tokyo Gakugei Univ.

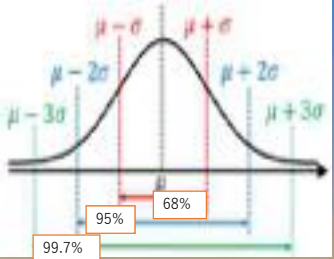
61 Hiroshima Univ.

59 Chiba Univ., Gifu Univ.

Aichi Univ. of Education (Benesse, 2019)

Deviation Value of Private Univ.in Education Major:

- 74 Waseda Univ.
- 70 Aoyama Gakuin Univ.
- 68 Kansei Gakuin Univ.
- 67 Bunkyo Univ.
- 64



Possible to Pass

Deviation value $1\sigma = 10$

筑波大学 University of Tsukuba

Reading Literacy Survey

The Project: Can AI pass the Univ. of Tokyo Exam? (2011-)

APEC

The same or different?

- The Shogunate expelled the Portuguese in 1639 and ordered Daimyo to guard the coast.
- In 1639, the Portuguese were expelled and the shogunate was ordered by Daimyo to guard the coast.
- 43% failed

The main sources are textbooks and newspapers.

Junior and senior high school students who had a correct answer of "same" and "different" synonym sentences are one third.

For the University of Tokyo Graduate Students:

Read the following sentence.
An enzyme called amylase breaks down starch that is formed by connecting glucose, but it cannot break down cellulose in different shapes even if it is made from the same glucose.

In this context, choose one of the options that best fits the blanks in the text below.

Cellulose is different in shape from ().

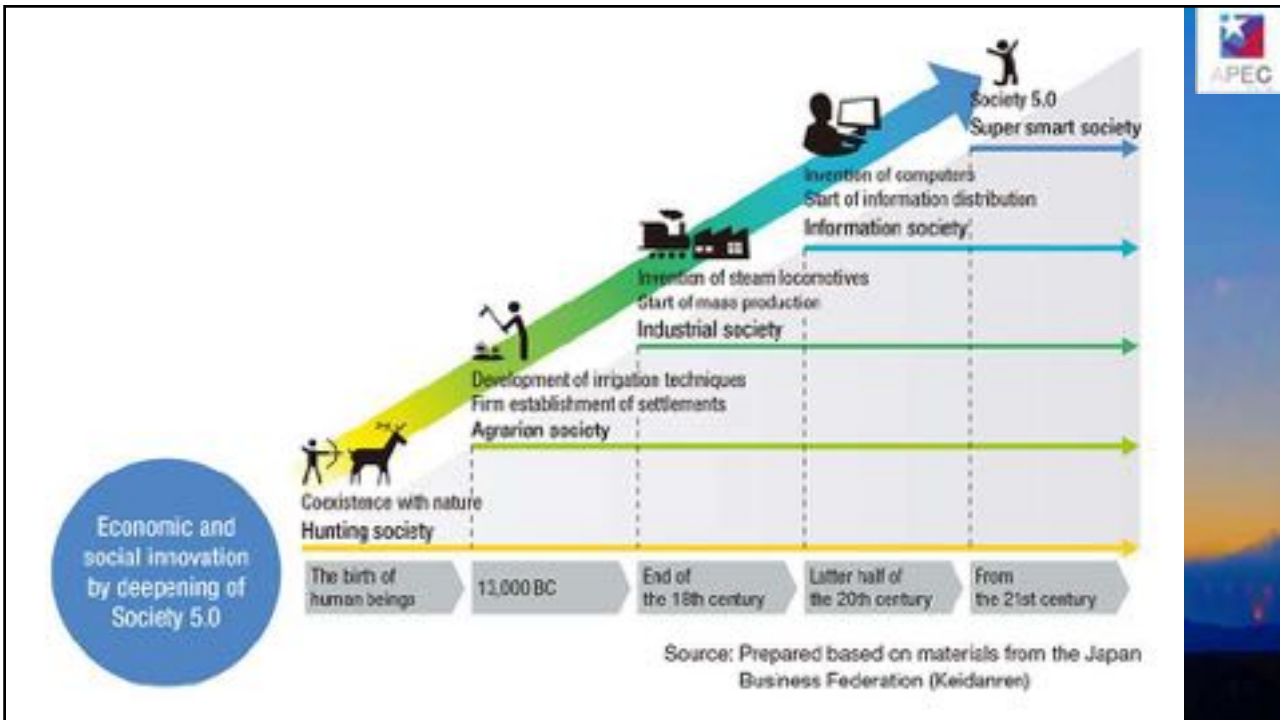
(1) starch (2) amylase
(3) Glucose (4) enzyme

筑波大学
University of Tsukuba

APEC

What is necessary as for human competency. Stereo Type Arguments

<p>Develop Humanity</p> <ul style="list-style-type: none"> • Creativity • Hospitality • Management <p>Develop Humanity <u>Without computer</u></p>	<p>Develop Digital Competency</p> <ul style="list-style-type: none"> • Knowing what AI can and cannot <p>Develop Digital Competency <u>with AI</u></p>
---	---





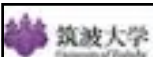
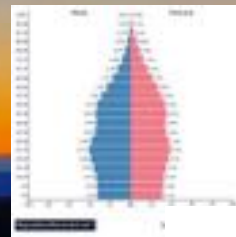
What is the Society on Industrial Revolution IV?

Japan is a leading country of Industrial Revolution IV?

Why?

High Cost for Employ + Aging Society

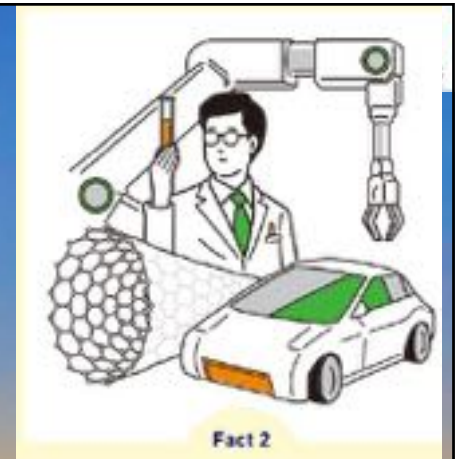
Society 5.0 = Most Aging Society + IR IV



Society 5.0




Fact 1
Abundant accumulation of real data
 Based in health and medical data from a universal health care system and a wealth of operating data from numerous manufacturing facilities, Japan has an environment rich in real and usable raw data for use in the current market economy and industry.




Fact 2
Technology cultivated from "monozukuri"
 Japan's advanced technology cultivated from "monozukuri" (Japan's excellence in the manufacturing of things) and years of basic research, will work as advantages toward creating products using information technologies like Big Data and AI, which can then be released into our society.

筑波大学 University of Tsukuba Society 5.0: Healthcare, Mobility APEC


Before




After



Before




After




筑波大学 University of Tsukuba Society 5.0: Infrastructure, FinTech APEC


Before




After

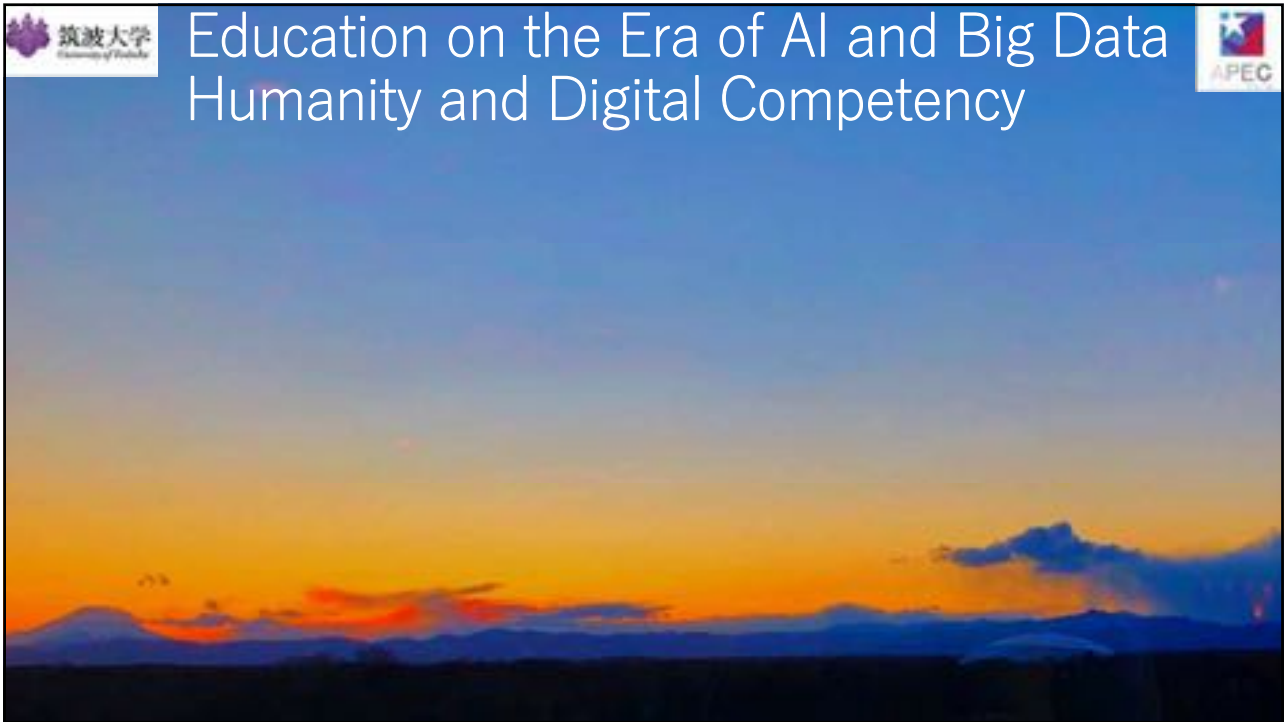


Before



After





Standardizations of Curricula

Objectives of Mathematics Education

Objectives of Mathematics Education on CCRLS Framework for Mathematics by SEAMEO-RECSAM for ASEAN (2017: Dom, Isoda, Pedro, & Kimho et al.)

<p>Mathematical Values, Attitudes and Habits for Human Character</p> <p>Mathematical Values: Generality and Expandability Beauty/pleasantness and Harmony Usefulness and Efficient Simpler and Easier Beauty/pleasantness</p>			<p>Mathematical Attitude attempting to: See and think mathematically Pose question and develop explanation such as why and when Generalize and extend Appreciate others' idea and change representation to conceptualize</p>	<p>Habits of mind for Citizen to live: Reasonably and critically with respecting and appreciating others Autonomously Creatively and innovatively in harmony judiciously using tools such as ICT Empowerly in Imagining the future through lifelong learning</p>	
<p>Mathematical Thinking and Processes</p> <p>Mathematical Ideas for: Set, Unit, Compare, Operate, Algorithm, Fundamental principle, and Various representation such as table, diagram, expressions, graph and translations.</p> <p>Mathematical Thinking: Generalization and Specialization Extension and Integration Inductive, Analogical and Didactical reasoning Abstracting, Concretizing and Embodiment Objectifying by representing and symbolizing Relational and Functional thinking Thinking forward and backward</p> <p>Mathematical Activities for: Problem Solving Exploration and Inquiry Mathematical Modeling Conjecturing, Justifying and Proving Conceptualization and Proceduralization Representation and Sharing</p>					
<p style="text-align: center;">Content</p> <table border="0"> <tr> <td> <ul style="list-style-type: none"> Numbers & Operations Quantity & Measurement Shapes, Figures and Solids Pattern & Data Representations </td> <td> <ul style="list-style-type: none"> Extension of Number and Operations Measurement & Relations Plane Figures & Space Solids Data Handling & Graphs </td> <td> <ul style="list-style-type: none"> Number & Algebra Space & Geometry Relationship & Functions Statistics & Probability </td> </tr> </table>			<ul style="list-style-type: none"> Numbers & Operations Quantity & Measurement Shapes, Figures and Solids Pattern & Data Representations 	<ul style="list-style-type: none"> Extension of Number and Operations Measurement & Relations Plane Figures & Space Solids Data Handling & Graphs 	<ul style="list-style-type: none"> Number & Algebra Space & Geometry Relationship & Functions Statistics & Probability
<ul style="list-style-type: none"> Numbers & Operations Quantity & Measurement Shapes, Figures and Solids Pattern & Data Representations 	<ul style="list-style-type: none"> Extension of Number and Operations Measurement & Relations Plane Figures & Space Solids Data Handling & Graphs 	<ul style="list-style-type: none"> Number & Algebra Space & Geometry Relationship & Functions Statistics & Probability 			

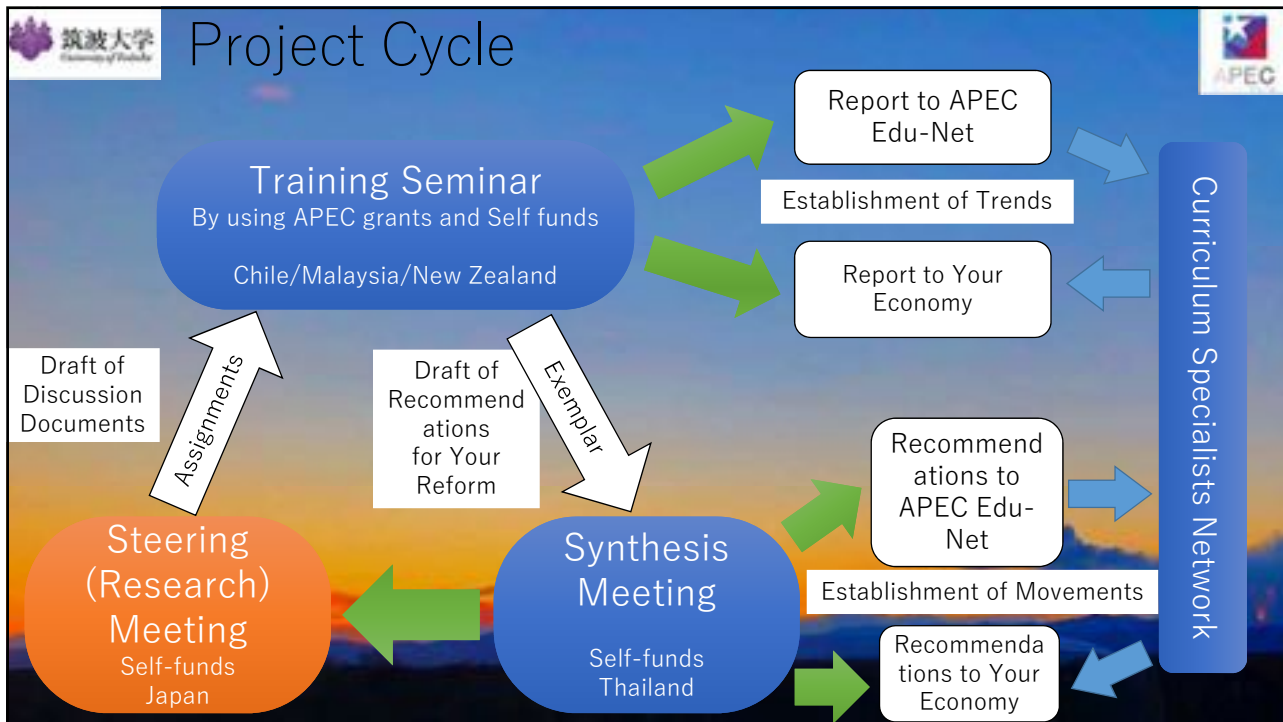
Appreciation

Reflection

Acquisition

SEAMEO Basic Education Standards (SEA-BES): Common Core Regional Learning Standards (CCRLS) in Mathematics and Science

Editors: Dornádoor Dizon, Nam Nua, Jahan Ahmad, Mustafizurrahman



What is the Role of US?
Establishment of new visions for Informatics and Statistics Education



Role of Discussion Documents:

- Trying to show the perspectives for the era of AI and Big Data
- Beyond and overcoming current existed issues

Your Roles:



- Provide and produce your vision (keynotes) or your economy's vision (delegates).
- Delegates:
 - Explain your curriculum standards with focusing on Basic Framework, Content and Sequence
 - Exemplar: Do not explain just the methods of teaching but explain
 - “teaching materials = content +objective under the curriculum sequence”
 - Explain what are missing in your curriculum in relation to discussion documents.
 - What are your **recommendations** and challenges for the Next Curriculum Reform. Teacher training is always necessary however do you have the perspectives for the training for newest issues?
 - Please write down your presentation within two pages in A4.

Your presentations are recorded and your presentation file will be uploaded on the web as for the reports of the seminar.

How do we produce Recommendations to APEC and APEC-Network

- You are the specialists to produce the recommendations and active contributors of APEC network for Informatics and Statistics.
- The major discussions will be the last day: Roberto and Orlando will resume tentative recommendation based on your presentations.
- However let's talk and know each other through the meeting and exchange necessary ideas because this meeting is not the time for new research in the research community but the time for sharing the ideas for future.
- Recommendations may include for what kinds of content and tasks should be included for your next curriculum reform.
- Final draft will be prepared at the middle of August.
- Until final draft, please produce the exemplar with clear objectives.
- At the Thailand meeting, participants must prepare the commentary for the draft and explain it by using exemplar.

The format of A4, 2 pages reports which are illustrated current status for the recommendations (write during this seminar)

<p>Title: Informatics Curriculum in Chile Name & Affiliations</p> <ol style="list-style-type: none"> I. National Standards Framework (the diagram is acceptable) II. Informatics Curriculum Sequence from Primary to Secondary. (the diagram/ flow map is fine) III. Informatics for High School 	<ol style="list-style-type: none"> IV. Informatics for High School (continue) V. Current status for implementation or Next Step (Vision)
---	--