


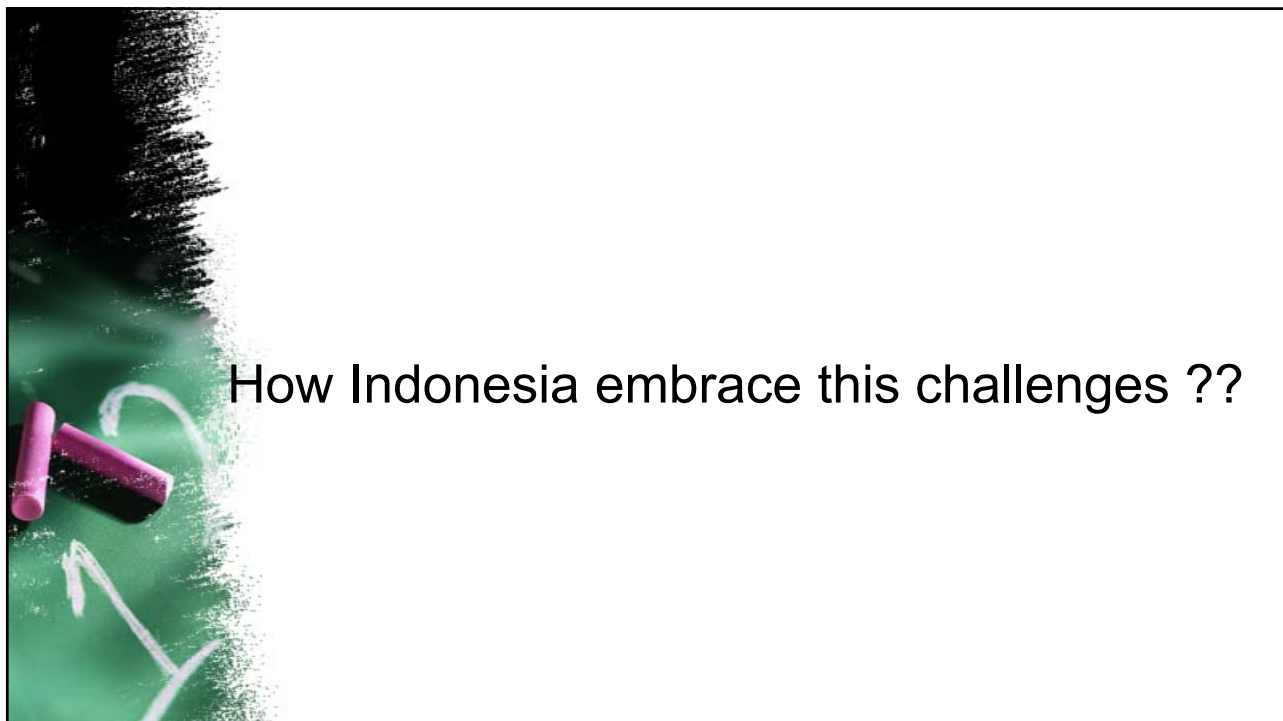
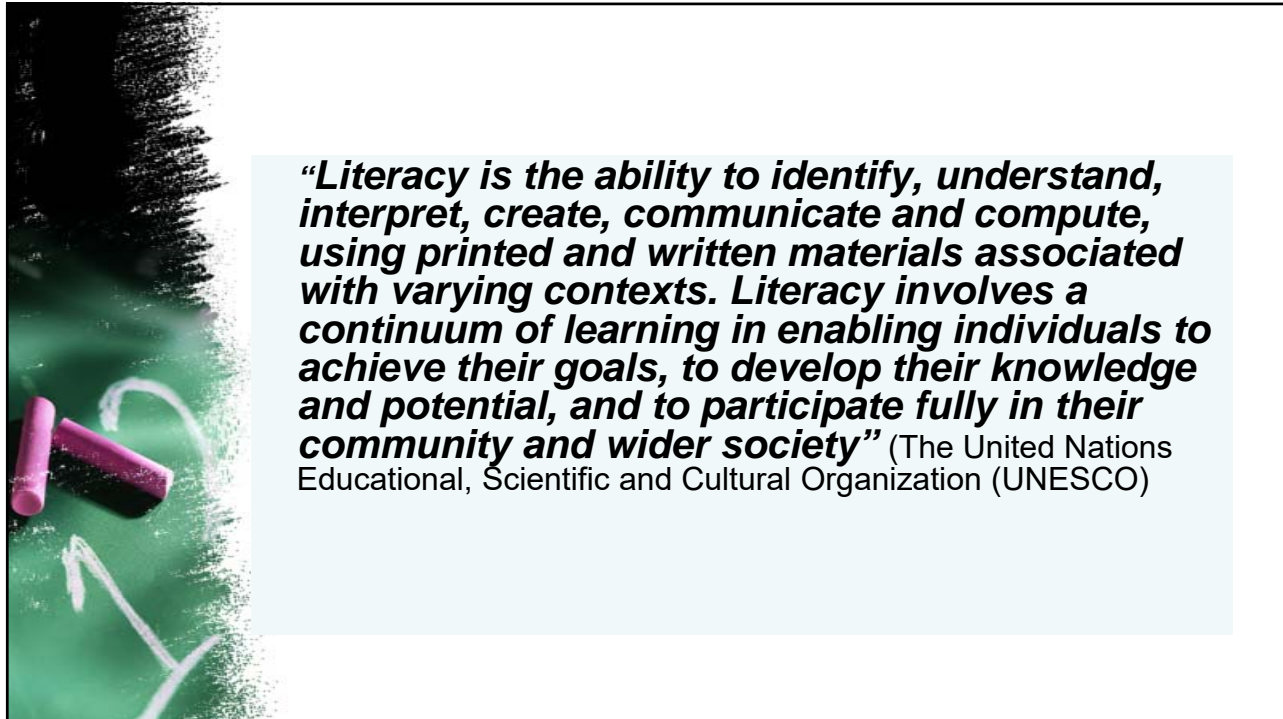
## Science Literacy in Indonesia: A brief picture of status, challenges and forward

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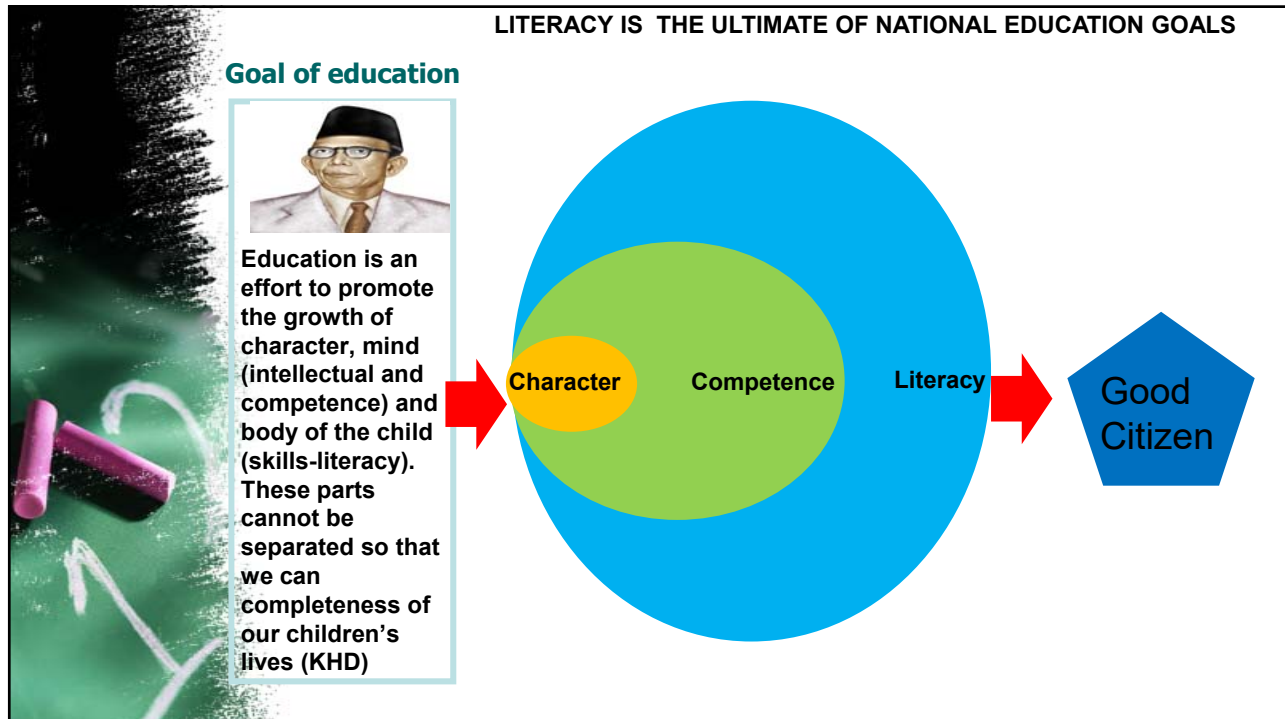
The Illiterate of the 21<sup>st</sup> century will  
not those who cannot read and  
write, but those who cannot learn,  
unlearn and relearn (Alvin Tover)





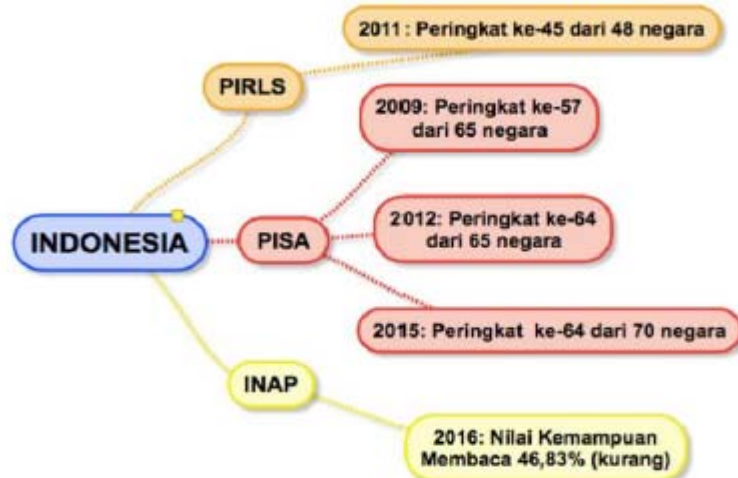
## The Facts

**Population :** 270,958,447  
**Area cover :** 2,905,000 km<sup>2</sup>  
**Ethnic groups:** >300  
**Language :** >700 living languages  
**GDP :** 1042.17 billion US dollars in 2018  
**ICP :** 3,893.6 US dollars  
**Schools :** 307,655  
**Students :** 45,379,879  
**Teachers :** 2,2755,020  
**Science teachers :** 133,925





## Indonesia in literacy realms



## What is worth knowing for Indonesian?

- personal needs
- societal needs
- global needs



## How should students think?

- Logically,
- independently,
- objectively,
- skeptically,
- critically,
- and rationally
- to reason scientifically and solve problems.

## Behaviors and attitudes?

What type of future citizens do we want to prepare?

The five principles  
National Identity of  
Pancasila?



## Science Teaching Processes Challenge in Indonesia: Ready-Made to Inquiry knowledge

### Experience & Education John Dewey



A clear and concise statement by  
the twentieth century's most influential  
philosopher of education

- Dewey (1910, p. 25) noted, “Science teaching has suffered because science has been so frequently presented just as so much **ready-made knowledge**, so much subject-matter of fact and law, **rather than as** the effective method of **inquiry** into any subject-matter.”



How science education process guides our nation toward a scientifically literate society ?

## Common elements of science literacy in Indonesia

### Knowledge:

- facts
- concepts
- vocabulary

### Skills:

- manipulative
- intellectual:
  - *scientific reasoning*
  - *critical thinking*
  - *problem solving*

### Dispositions:

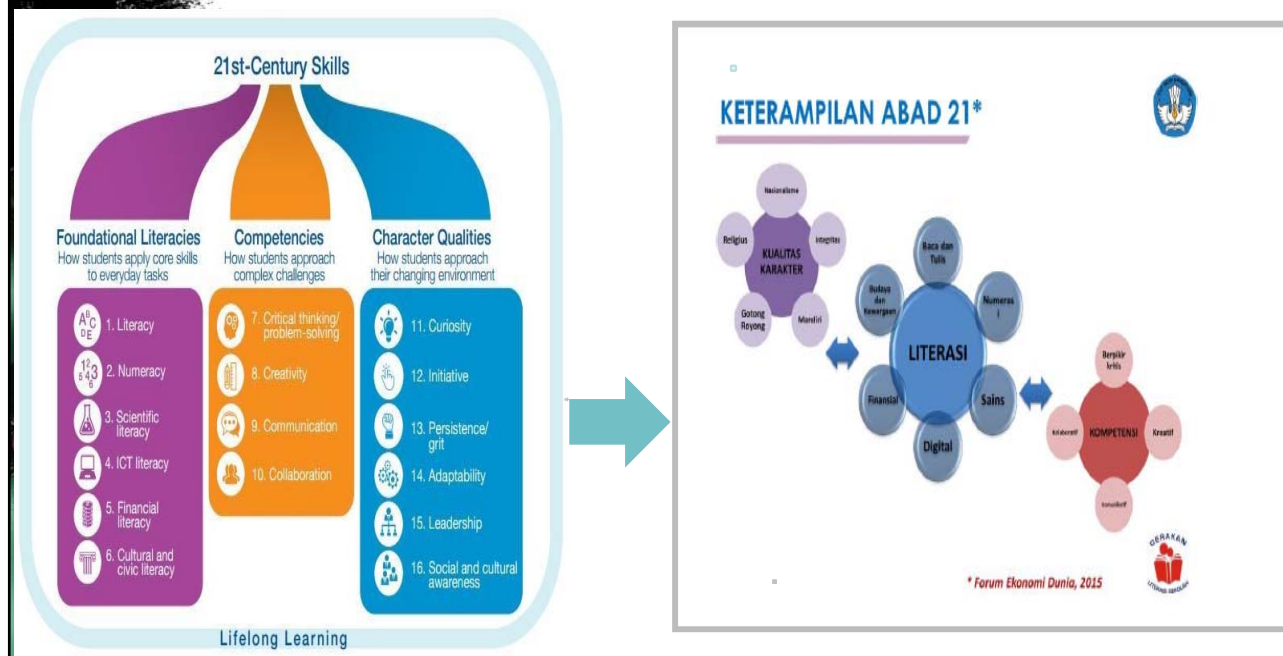
- attitudes
- behaviors



## Unseen National Challenge with A broad perspective in Science Literacy in Indonesia

Science ↔ Public  
CULTURAL DISTANCE

### LITERACY AND 21<sup>ST</sup> CENTURY SKILLS IN NATIONAL CURRICULUM





## Nasional Literacy Movement (2016)

1. Family Literacy
2. School Literacy
3. Teacher and education personnel literacy
4. Language and literature literacy
5. Culture Literacy
6. Society Literacy

## Learning strategies to foster social and emotional skills



# ONE of INDONESIAIAN way to Achieve Science Literacy in teacher training

## Levels of Inquiry of Science Teaching

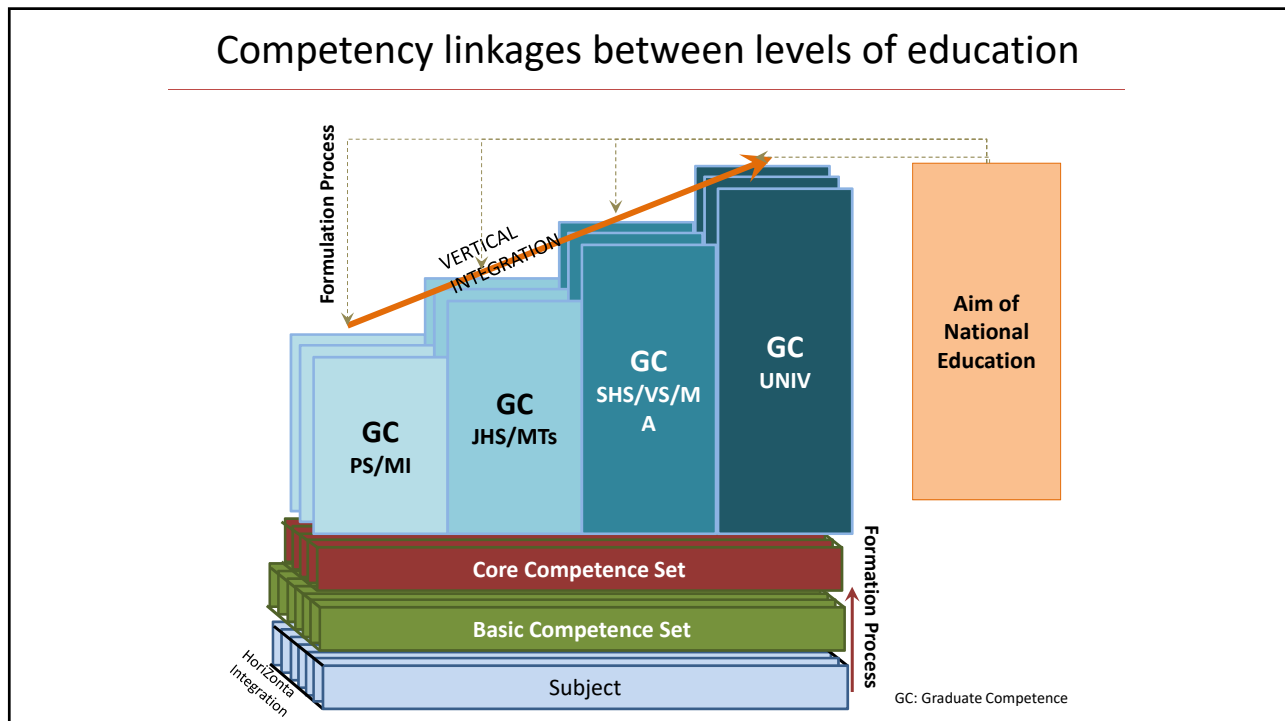
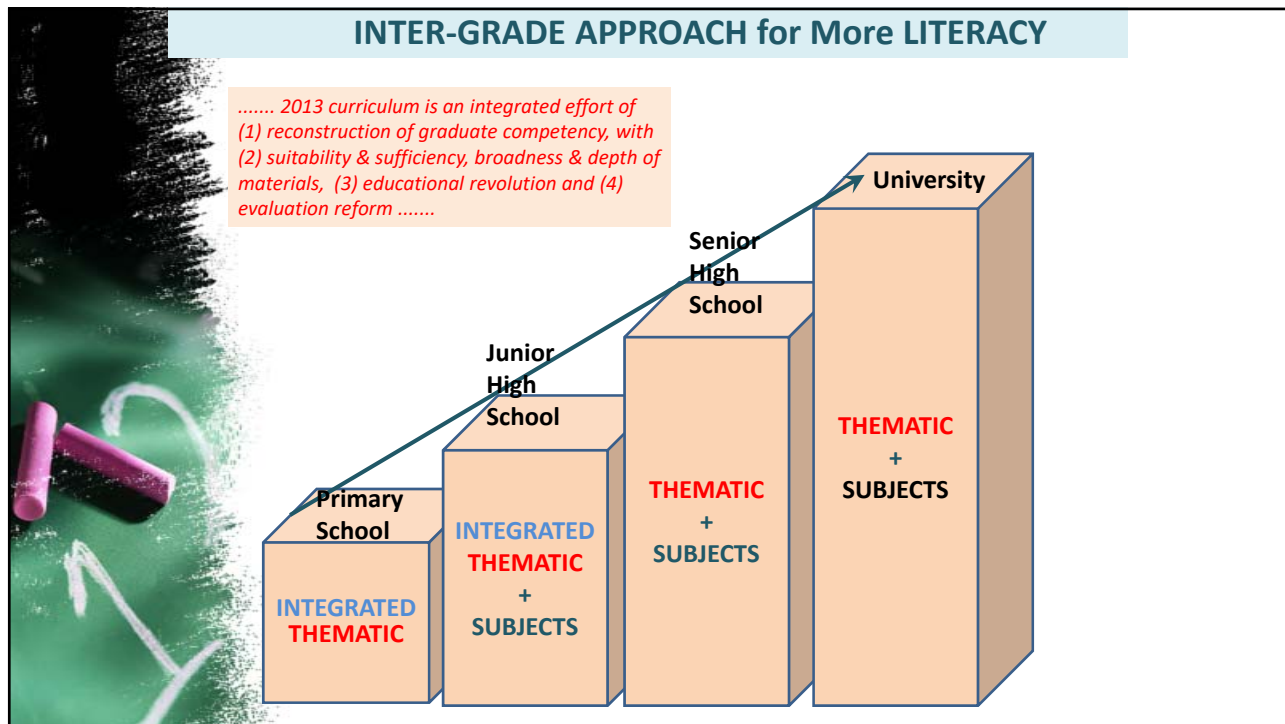
Discovery Learning	Interactive Demonstration	Inquiry Lesson	Inquiry Lab	Real-world Application	Hypothetical Explanation
Teacher		Locus of Control		Student	
Low		Intellectual Sophistication		High	

- Each level has associated with it progressively more sophisticated intellectual and scientific process skills.

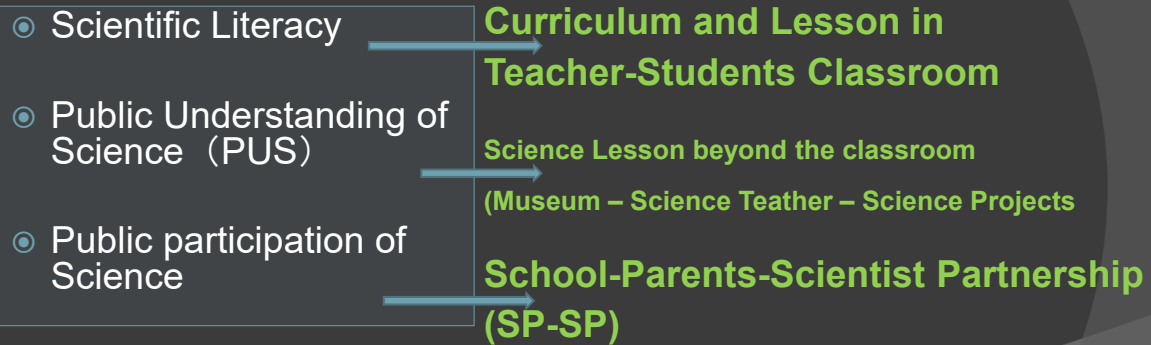


Change Science Curriculum		
No	Previous Curriculum	Current Curriculum
1	The learning material is presented separately in Physics, Chemistry, and Biology	The learning material is presented integrated , no more separation between Physics, Chemistry, and Biology
2	No platform, all studies stand in line	Use Biology as a study platform with consideration of all natural events and phenomena associated with the objects and their interactions among these objects. The goal is to emphasize the importance of interaction of biology, physics, chemistry and their combinations in forming a stable bond.
3	Earth and space science materials is still inadequate [partly discussed in Social]	Completed with earth and space science materials in accordance with international standards
4	The material tend to be superficial and memorizable	The material enriched with the needs of students to think critically and analytically in accordance with international standards
5	Learning materials were taught by different teachers (team teaching) with certification based on the subject.	Learning materials are taught by a teacher who gives an insight into the integrated subject area so that students can understand the importance of integration between subjects before studying them in detail separately in the next education level

Steps of Strengthening Process of Literacy (all Subjects)	
Process	Strengthening Characteristics
Teaching and Learning Process	<b>Applying scientific method</b> by observing, asking, experiencing, thinking,....
	Using science and knowledge as a teaching and learning motor for all subjects.
	Encourage students to find out the information, not to be informed [ <i>discovery learning</i> ]
	Emphasizing the language competence as a tool of communication, knowledge carrier, and having competence of logical, systematic and creative thinking.
Assessment	Assess students' level of thinking starting from low to high
	Emphasizing deep thinking question (not merely memorizing)
	Assess students working process, not only the product
	Using students' learning portfolio



## Future Effort: Public Understanding of Science



**All concepts relates to how the public  
perceive Science.**

### Research findings (science lesson beyond classroom)

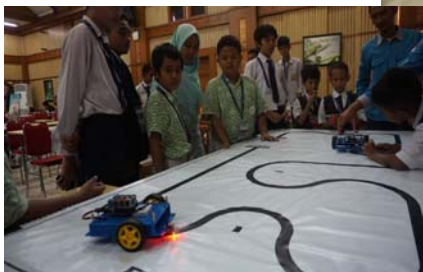
1. Better in understanding the science concept (Awaluddin, 2010)
2. Have higher achievement (Kurniawan, 2011)
3. Observation skill increase 100%, prediction 60% and interpretation 65% (Rachmawati, 2013)
4. Science literacy evidence base has increase 17,99% (Kurniasih 2013)
5. Student behavior toward science increase 78,7 % (Balitbang, 2016)



Science Lesson beyond the class room



Making Robotic





Geology Museum-Bandung



Zoological Museum -Bogor



Science Museum-Jakarta



Taman Pintar-Jogjakarta

International  
Recognize  
Museums

## This is inline with Definition of Scientific Literacy By PISA

- “Scientific literacy is the capacity to use scientific knowledge, to identify questions and to draw evidence based conclusions in order to understand and help make decisions about the natural world and the changes made to it through human activity. (OECD, 2003, p133)

