

Supporting Human Resource Development for Industry, Science and Technology

# Let children get mathematics and science!



JICA supports mathematics and science education with an aim to equip all children with basic skills and abilities to learn and think by themselves. In light of Japan's competitive advantage in mathematics and science education that have supported our post-war economic growth, JICA provides comprehensive solutions ranging from curriculum, lessons, to learning assessments. Mathematics and science education leads to human resource development for industry, science and technology that are indispensable for fostering social growth and structural transformation in the future.



Unique know-how, experience and technologies originating in Japan and cultivated at international cooperation sites around the world are proving useful in the field in many developing countries. JICA is disseminating these methods and program models that are effective for solving problems to the rest of the world as the Japan Brand of international cooperation and promoting its use.



Of the 17 Sustainable Development Goals (SDGs), strongly associated goals are shown in color.

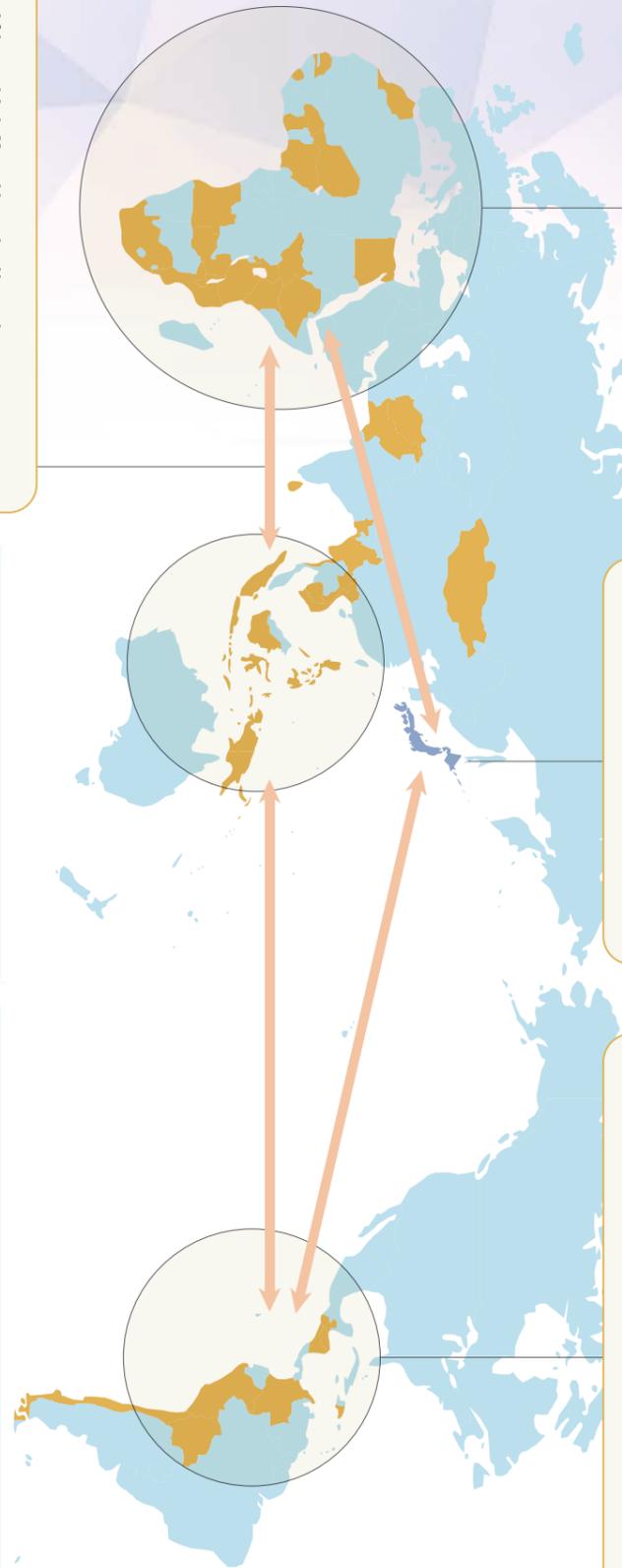
## JICA's support for mathematics and science education throughout the World

JICA's support for mathematics and science education has been implemented around the World through mutual learning networks within and across regions in Africa, Central America and Asia and between Japan and the World.

**African mathematics and science education network**  
Support for mathematics and science education has expanded to 27 countries in Africa. About 21% of all mathematics and science teachers in Africa have received training with support of JICA. In collaboration with the Association for the Development of Education in Africa (ADEA), JICA will continue to expand mutual learning across the countries in Africa.

**Mutual learning network between Japan and the World (Capacity Development opportunities in Japan)**  
JICA will continue to provide capacity development opportunities in collaboration with Japanese universities, and to promote mutual learning between Japan and the World in the area of mathematics and science education.

**Central America mathematics education regional cooperation network**  
Primary school mathematics teaching materials including textbooks and teachers' guides developed in four Central American countries have been used nationwide respectively. The learning assessment (LECE) in Latin America showed that the rank of Honduras in mathematics has improved, which can be a result of our successful cooperation. JICA will develop textbooks and teachers' guides at the secondary education level, through involving more countries in the region.



**Africa and Asia Mutual Learning Network**  
In 1986 JICA started support for mathematics and science education in Malaysia and has implemented it in a comprehensive manner in Indonesia. Through international conferences and third-country training programme, JICA will promote mutual learning globally in the field of mathematics and science education.

\* Colored with yellow are the countries supported by JICA in mathematics and science education.  
\* 2,686 Japan Overseas Cooperation Volunteers were dispatched as mathematics and science teachers (as of the end of June 2015).

**Comments from Global Partnership for Education**



The Global Partnership for Education and JICA have been sharing good practices globally including for science and math.

Alice Albright, CEO  
Global Partnership for Education

Photo provided by: Global Partnership for Education

**Comments from a Nobel Prize Winner**



Mankind, has been in prosperity by utilizing various stuff in the nature based on knowledge about its mechanisms. The future for the mankind is possible only by learning knowledge obtained by our predecessors and transmitting it to the next generation. Mathematics and science education is an important pillar for this purpose. In accordance with the progress of science, it is important to constantly review our curriculum in mathematics and science education.

Makoto Kobayashi  
High Energy Accelerator Research Organization, Honorary Professor Emeritus  
2008 Nobel Prize Winner (Physics)

Photo provided by: KEK

Photos: JICA (except specially mentioned items)

January 2016

**40% of Children are not Learning Basics**

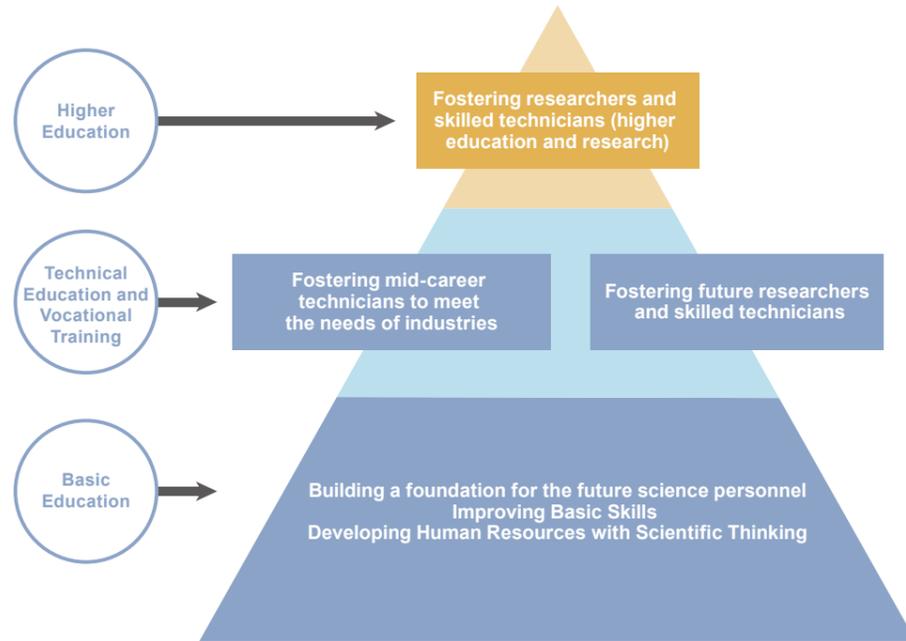
The primary education enrollment rate in developing countries has improved up to 90% (2012), but about 30% of children do not complete primary schools. Furthermore, currently about 40% of children, which are equivalent to 250 million primary school-aged children worldwide lack basic literacy and numeracy skills.

**250 Million Children lack basic skills**

Source: EFA Global Monitoring Report 2015

**Mathematics and Science Education is a Foundation for Social and Economic Development**

Mathematics and science education can foster scientific thinking and attitudes, as well as rational judgment ability, which are crucial for the establishment of a prosperous and safe society in the field of health, sanitation, agriculture, disaster prevention, employment, etc. Furthermore, human resource development for industry, science and technology (researchers and skilled technicians) are indispensable for fostering social growth and structural transformation in the future.



**The strength of Japan is Mathematics and Science Education that the children can “learn”**

The strength of Japanese education system is a firmly established learning cycle: 1) quality curriculum, 2) textbooks and teachers' guides that translate the curriculum, 3) learner-friendly lessons that are fully buttressed with teacher training system, and 4) assessments whose results are fed back for the improvement of teaching and learning.

Japan has achieved its rapid economic development in a short period after the World War II, even though Japan has limited natural resources. Japan has developed policies that related mathematics and science education to science and technology and human resource development. The “Industrial Education Promotion Law” (enforced 1951) and the “Science Education Promotion Act” (enforced 1954) were implemented as measures to integrally enhance science and

technology education. As a result of this, Japan has consistently occupied top ranks in the “Trends in International Mathematics and Science Study” (TIMSS) and “Programme for International Student Assessment” (PISA) since the inceptions. In addition, Japan has seventeen Nobel Prize winners in the field of Physics and Biology. Except the United States, Japan holds the largest number of Nobel Prize winners in the field of natural science in the 21st century.

**Achievement of cooperation with 60 countries and 930,000 people**

With the first dispatch of the Japanese Overseas Cooperation Volunteers in the field of mathematics and science education to Malaysia in 1966, JICA has started technical cooperation projects in this field since 1994. So far, JICA has cooperated with approximately 60 countries\* (as of June, 2015). JICA has successfully provided training opportunities for over 930,000 teachers in total; supported the development of textbooks and teaching and learning materials and the establishment of teacher training programs. In recent years, JICA has also made concerted efforts in assisting curriculum review/revision and improvement of assessments.



\* Technical cooperation in the field of mathematics and science education in 42 countries, and the Japanese Overseas Cooperation Volunteers (mathematics and science teachers) in 32 countries.

**JICA's Solution**

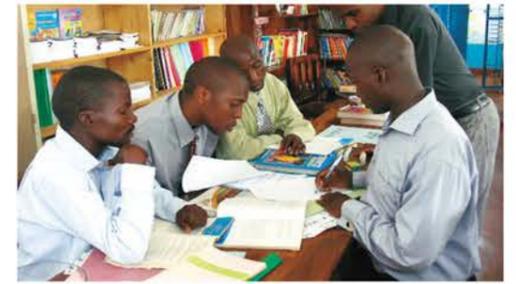
In order to support the development of basic academic skills and abilities to learn and think by themselves for all children, JICA offers comprehensive solutions that enables to provide consistent interventions throughout 1) curriculum and textbooks, 2) lessons, 3) learning and 4)

assessments in order to strengthen the “Learning Cycle”. Meeting diverse and specialized needs, knowledge and experience of Japanese private enterprises, including ICT (Information and Communications Technology) will be utilized.



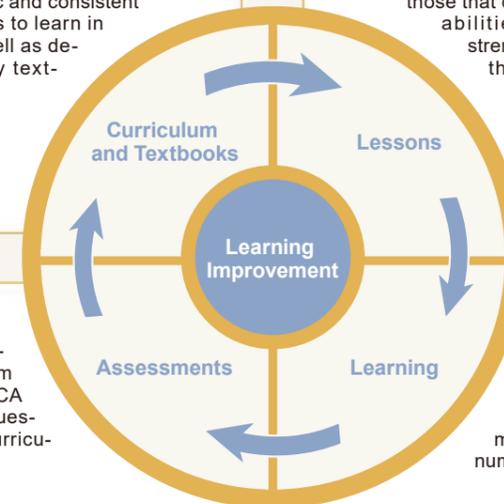
**Curriculum and Textbooks**

Teacher/learner-friendly curriculum and textbooks are essential tools for strengthening teachers' capacity to teach and facilitating learning for children. JICA supports development of systematic and consistent curriculum that allows students to learn in an accumulative manner, as well as development of learner-friendly textbooks.



**Lessons**

The foundation of children's learning is daily lessons. In order to teach abstract concepts in mathematics and science, a shift from knowledge-crammed lessons to those that can foster children's problem solving abilities is necessary. JICA supports strengthening teachers' capacity to teach through in-service and pre-service trainings, and content development (lesson plans and teachers' guides).



Assessments with rote learning questions will not improve children's learning even if curriculum and textbooks are improved. JICA helps to improve assessment questions that are consistent with curriculum, textbooks, and lessons.

**Assessments**



Acquiring basic skills such as numeracy is essential to ensure that children are learning. JICA supports development and dissemination of teaching and learning materials for children acquiring basic numeracy skills.

**Learning**

