Creativity and Innovative Mind: Key to Learning in the 21st Century

Masuo Aizawa,
Executive Member, Council for Science and Technology Policy
Cabinet Office, Government of Japan

High-Level Expert Meeting

Bangkok, Thailand, 26-28 November, 2012
Grameen Phone initiatives
Remote Consultation

Bangladesh
By GrameenPhone, since 2006, country-side coverage
15,000+ Calls Per Day, 15 Yen for first 3 minute consultancy

- 15,000 medical consultations per day provided by 200 MDs with call center applications
- Merely cellular phones (no medical testing devices) available at patient sides
- Continual medical care is very difficult

A suitcase package w/ medical testing devices and remote audio/video communication devices

Village phone lady (medical staff) visits a patient with the suitcase

IC card system for storing medical testing results at patient sides

Hopefully 300$ per case
Pilot Testing 2011

Middle-risk, High-risk patients In 2 months

July 2012 N=600

Low-risk (69%)
Middle-risk (17%)
High-risk (2%)
No-risk (12%)

e- medicine consultation

High-risk (13%)
Middle-risk (87%)

September 2012 N=96

High-risk (13%)
Low-risk (44%)
Middle-risk (42%)
No-risk (2%)
Shared background

Ever changing world of 21st Century
Enforced to address the multiple grand challenges under fiercer constraints

The world population increase from 7.0 billion (2011) to 8.0 billion (2015),
Its two thirds will live in Asia.
Asia becomes the biggest producer and exporter of the world.
Asia catches up with the U.S. and Europe in the area of research.

We are enforced to address these grand challenges for realizing growth with sustainability and prosperity of society in the globally competitive and interconnected world.
Top 20 GII and Top 10 GDP (High GII and High GDP)

USA
GII=1
GDP=1

Canada
GII=8
GDP=9

Germany
GII=3
GDP=5

UK
GII=3
GDP=5

France
GII=5
GDP=6

Switzerland
GII=6
GDP=22

Netherland
GII=9
GDP=16

Singapore
GII=7
GDP=44

Hong Kong
GII=10
GDP=36

Japan
GII=4
GDP=2

Top 20 GII and GDP ranking lower than 10th (High GII and Low GDP)

Canada
GII=8
GDP=9

USA
GII=1
GDP=1

UK
GII=3
GDP=5

France
GII=5
GDP=6

Switzerland
GII=6
GDP=22

Netherland
GII=9
GDP=16

Singapore
GII=7
GDP=44
Top 20 GII and Top 10 GDP (High GII and High GDP)

USA
GII = 1
GDP = 1

Germany
GII = 2
GDP = 4

Switzerland
GII = 7
GDP = 19

Netherland
GII = 10
GDP = 16

Korea
GII = 6
GDP = 14

Japan
GII = 9
GDP = 3

Singapore
GII = 5
GDP = 39

UK
GII = 4
GDP = 6

Denmark
GII = 8
GDP = 31

Sweden
GII = 3
GDP = 22

Top 20 GII and GDP ranking lower than 10th (High GII and Low GDP)

USA
GII = 1
GDP = 1

Germany
GII = 2
GDP = 4

Switzerland
GII = 7
GDP = 19

Netherland
GII = 10
GDP = 16

Korea
GII = 6
GDP = 14

Japan
GII = 9
GDP = 3

Singapore
GII = 5
GDP = 39

UK
GII = 4
GDP = 6

Denmark
GII = 8
GDP = 31

Sweden
GII = 3
GDP = 22
Top 20 GII and Top 10 GDP (High GII and High GDP)

Top 20 GII and GDP ranking lower than 10th (High GII and Low GDP)

GII ranking lower than 20th and Top 10 GDP (Low GII and High GDP)
Climate Change and Natural Disasters

Energy and Resources

Demographic Change

Grand Challenges
Global and Local

Threats to Sustainability and Growth

Urgent Need for Innovative Next Generation
Evolution of Science and Technology Policy in Japan Focusing on Innovation

New Education Policy
The 4<sup>th</sup> S&T Basic Plan

The 3<sup>rd</sup> S&T Basic Plan
✓ R&D has promoted based on the important 8 fields.

Prioritized 4 areas: Life Science, ICT, Environment, Nanotech/Materials
Promoted 4 areas: Energy, Manufacturing technology, Social Infrastructure, Frontier

✓ The grand challenges remained unresolved through discipline-oriented approach.

The 4<sup>th</sup> S&T Basic Plan

From discipline-oriented to issue-driven approach

Drastic enhancement of basic research

Promote an integration of S&T and innovation performance

Creating new values
Issue-driven Innovation
Diverse Approach
Grand Challenge
Education Principle  (MEXT, 2004)
Zest for Living

Solid academic Prowess

Basic Knowledge
Learn & think themselves
Make decisions

Well-rounded character
Self-Control (discipline)
Cooperate with others
Empathy

Moral and body

Physical Health
Mental Health

Healthy Body

Balance between acquisition of knowledge/skills & sense of judgment / critical thinking

More and more vital principle to live in Knowledge-based society

Only possible with collaboration among schools, families and communities

Zest for Living
Zest for Living: Five Issues

• Lack of shared understanding among stakeholders

• Overestimating self-reliance of students

• Lack of integration of problem-solving approach to subjects

• Insufficient lesson hours for experience-based learning

• Underestimating decline in educational functions of families/communities
Discovery Skills for Innovative Mind
Disruptive Innovation Model

Innovation: Hereditary ability vs. learned skills

• Research study by C. Christensen et al.
• Survey for 500 innovators (75 countries) and leaders of 5,000 enterprises
• “Creative intelligence” leads to discovery
• Changing actions can bring out creative influence
• Creativity is not hereditary nor cognitive skills, but learned skills

Dyer, Gregersen and Christensen, 2011
Discovery Skills

Questioning
Break out of status quo, considering new possibilities

Observing
Detect behavior details, suggesting new ways of doing things

Experimenting
Try on new experiences and explore the world

DIVERSE NETWORK
Gain radically different perspectives from diverse backgrounds

Challenge status quo

ACTION SKILLS

CREATIVITY
LEARNED SKILL

Communities
Schools
Families

Learning at school, in families, in communities
Anti-Malaria Project in Africa
Characteristics

216 million cases of malaria are still found and an estimated 655,000 death in 2010. However, malaria mortality rates have fallen by 25% globally since 2000, and by 33% in the WHO African Region (WHO, 2010)

“Olyset” LLTN by Sumitomo Chemical
Simple but revolutionary

Use of permethrin

Advanced technology to incorporate permethrin within monofilament fibers

Tanzania

©Times Magazine
Anti-Malaria Project in Africa
Discovery skills

**Association**
- Infant memory
- Simple & revolutionary Technology
- Africa

**Questioning**
- "Why not 100% prevention rate?"
- "Why not simple and revolutionary?"
- "Why low repetition rate?"

**Networking**
- Exxon Mobil
- WHO
- UNICEF & Rockefeller
- Local enterprises, etc.

**Experiment**
- Prevention rate of 100%
- Right size of the mesh 4mmx4mm
- Safety
- For African-based production

**Observation**
- Time constraint
- Distance
- Simple and attractive
- Effect of "Magical power"

**Spread of Long-lasting Insecticide-treated nets (LLTNs) to combat Malaria**
Anti-Malaria Project in Africa
Result

“Olyset” LLTN by Sumitomo Chemical
Simple but revolutionary

Quality control by WHO
(pesticide evaluation system)

Local technology transfer for local production

Production of 30 million “Olyset” in Tanzania annually

First purchase by UNICEF

Producing local employment

Quantity & long-term commitment reduced price

Tanzania
Concluding Remarks
Intellectual Hub

Arabic numerals

Foreign academic (geography, philosophy, medicine, astronomy)

Literature

Renaissance

14~16C

Sculptor

Typography

Silicon Valley

1970-1990

Islamic Renaissance

8~13C

Artist, inventor

Poet, Philosopher

Damascus

Tunis

Semi-conductor

Arts & Design

Programming

Investment

Venture

Education experts

Policy makers

Economists

ICT Experts

Bangkok

Science

8~13C

Beyound 2015 Education

Policy makers

International Civil Servant

Bangkok

Silicon Valley

1970-1990

Education experts

Neuroscientists

Poet, Philosopher

Sculptor

Intellectual Hub

Arabic numerals

Islamic (geography, medicine, astronomy)
Concluding Review

Globalized and Interconnected

Sustainability

Diversity

Transforming Times
Supplemental Slides
生きる力

内容の充実

・思考力・判断力・表現力を育む
・伝統や文化に関する教育を充実する
・道徳教育を充実する
・健やかな身体を育てる
・社会の進展に対応した教育を行なう
・体験活動を充実する
・理数の力をはぐくむ
・外国語教育を充実する