Skills and Education to Support Innovation and Productivity in East Asia: 
*Investing in the Future, Creating New Value*

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Students take a computer course in Cambodia. Photo: © Masaru Goto/World Bank
Why are skills important?

What are the skills gaps?

How do we approach skills development?
How do we define “skills”? 

Academic

Generic (Life)

Skills for Innovation

Technical
Why are skills important?

Correlated with Innovation, Productivity and Growth

• Evidence of direct relation between cognitive skills productivity and growth

• Emerging literature demonstrates link between cognitive ability and non-cognitive skills (intended mostly as behavioral skills) and labor market outcomes
  – e.g. Canada – higher reading scores at age 15 lead to higher future wages

• Management skills are positively correlated with innovation and productivity

• High level science, technology, math and engineering (STEM) academic and technical skills are systematically correlated with innovation
Slight correlation between growth and years of education

Source: Hanushek and Wößmann (2007)
Strong correlation between growth and test score

Source: Hanushek and Wößmann (2007)
Today, different skills are in demand
Demand shifting towards technical and high level generic skills

Types of Skills in the United States

Source: Levy and Murnane (2005)
Current skills mismatches

- Current skills mismatches
  - Unemployment of tertiary graduates (% of total unemployment)
    - Professional Vacancies
    - Tertiary Unemployment

Co-existence of unemployed workers and vacant jobs

Source: Sakellariou (2010) and Investment Climate Surveys, various years
Workers' skills an obstacle:

The diagram shows the share of firms reporting skills of workers as an obstacle, in East Asia, by country. The y-axis represents countries, including South Korea, Cambodia, Laos, Philippines, Malaysia, Vietnam, Indonesia, Mongolia, Thailand, and China. The x-axis represents the share of firms reporting skills as an obstacle, ranging from 0% to 70%.

The categories on the bar chart are Major or Very Severe Obstacle, Moderate, Major, Very Severe Obstacle.

Source: Almeida (2009)
There are major skills gaps

Employer reported gaps

– Employer demands and workers’ supply of skills
– Academic (basic literacy and numeracy skills)
– Technical (IT/computer, English, practical knowledge of the job)
– Generic gaps most pervasive
  • creative thinking and problem solving
  • behavioral – communication, negotiation, organization, time-management, and adaptability

Larger gaps in technologically innovative and export-oriented firms
Workers’ skills an obstacle:

Share of Firms Reporting Skills of Workforce as an Obstacle by Technological Intensity

Firms Not Engaging in Technological Innovation vs. Firms Engaging in Technological Innovation

Source: Investment Climates Surveys, various years
How do we approach this?
World Bank STEP Framework

1. Getting infants off to the right start
2. Ensuring that all students learn
3. Building job-relevant skills
4. Encouraging entrepreneurship and innovation
5. Facilitating labor mobility and job matching

Productivity & growth
Build a strong foundation in early childhood and basic education

Preprimary School Enrollment

Europe
OECD
Latin America & Caribbean
East Asia
South Asia
Middle East & North Africa
Sub-Saharan Africa

Source: World Bank EdStats
Build a strong foundation in early childhood and basic education

East Asia Preprimary School Enrollment

- Hong Kong, Korea
- Japan
- Indonesia, Malaysia, Philippines, Thailand
- China
- Cambodia, Laos, Mongolia, Vietnam

Source: World Bank EdStats
Nutrition is important too

<table>
<thead>
<tr>
<th>Early Transition</th>
<th>Advanced Transition</th>
<th>Full Transition</th>
</tr>
</thead>
<tbody>
<tr>
<td>(high stunting, high</td>
<td>(high to moderate stunting, improving</td>
<td>(low stunting, high</td>
</tr>
<tr>
<td>maternal undernutrition,</td>
<td>maternal undernutrition, moderate obesity)</td>
<td>obesity rates)</td>
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<tr>
<td>low obesity rates)</td>
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<tr>
<td>Cambodia</td>
<td>China</td>
<td>Thailand</td>
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<td>Lao PDR</td>
<td>Mongolia</td>
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<td>Vietnam</td>
<td>Indonesia</td>
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<td>Philippines</td>
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<td></td>
<td>Malaysia</td>
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</tbody>
</table>

Source: World Bank East Asia and Pacific Region Nutrition Strategy (FY11-FY15) Staying on Track
An example of where cognitive development falls short

An example of where cognitive development falls short

Cambodia Cognitive Development by Stunting

High enrollment ≠ Quality education

2007 TIMSS Grade 8 Enrollment, by Level of Mathematics Skill

Countries in Region vs. OECD Average

2009 PISA Scores for East Asia, United States, and OECD

Source: PISA 2009 Results, OECD (2010)
Increase spending ≠ Increase in test scores

Change in Spending and Quality from TIMSS 1999 to 2007

Develop skills for the labor market

- Formal upper secondary education
- Second-chance education
- TVET (Technical and Vocational Education and Training)
- Tertiary education
- On-the-job training
Invest in skills for competitiveness
TVET

• Popular substitute for traditional upper secondary education
• Firms complain that TVET systems produce the same graduates year after year with little regard to changing labor market signals and some job-relevant skills
• TVET in Indonesia and the Philippines shows weaknesses in generic skills and quality of teaching
Pay attention to equity issues

Predicted Ratio of Majority to Minority Enrollments and Completions, Tertiary

- Cambodia
- Vietnam
- Thailand
On-the-Job Training (OJT)

• Develops skills when education and pre-employment training are not sufficient
• Can lead to higher rates of return, wages, and productivity
• More prevalent in firms
  – Large
  – Export-oriented
  – Technologically innovative
  – Foreign ownership
  – Staff with more schooling
Develop skills for innovation

Desired by employers
- Creativity/entrepreneurial skills
- “Big picture” mindset
- Ability to “think outside the box”
- Leadership skills
- Business skills

→ Lacking in lower and middle-income East Asia
Step 4

Thailand

Creativity is the third most important skill that professionals lack in doing their job (manufacturing)

Source: Enterprise Survey (ICS)
Foster entrepreneurship and creativity

Large informal sector
- 80% in low income countries
- 50% in middle income countries

Limited policies to support entrepreneurship, with focus on SMEs

Difficult to start a company in countries like Vietnam and Cambodia

Business incubators for SMEs still relatively rare
Higher education can support innovation

Correlation between Tertiary-Educated Workers and Firm Innovation

Correlation between Patents and Higher Education R&D

Technological capability will require university graduates in science and engineering (still low)

Source: Enterprise Surveys (ICS); UNESCO Institute of Statistics, World Bank EdStats, World Development Indicators
Benefits of HE vs. Constraints

Higher education systems have not been able to deliver on innovation in lower and middle-income East Asia

Critical constraints include:
- Poor Faculty Quality
- Public Financing
- Service Delivery Failure
Higher Ed institutions **lack** autonomy and accountability

<table>
<thead>
<tr>
<th>Accountability</th>
<th>Autonomy</th>
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</thead>
<tbody>
<tr>
<td>Full (Central, Local, Institutional Levels)</td>
<td>High</td>
</tr>
<tr>
<td>Singapore</td>
<td></td>
</tr>
<tr>
<td>Central and some Local/Institutional levels</td>
<td>Japan, Hong Kong</td>
</tr>
<tr>
<td>Only Central level</td>
<td></td>
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Case study: Korea
Employment Services (1995)

Integrate job-search assistance

One-stop shop for job-seekers
- Information about jobs and job counseling
- Employment promotion benefits: incentives for job-search, training
  - Grants to facilitate job-search in distant areas
  - Mobility premium

Fairly high placement rate

Covers all companies

Cost = 0.36% of GDP
Skills are important

Skills gaps exist

STEP framework is a useful approach
### STEP: Path Dependence

<table>
<thead>
<tr>
<th>Step</th>
<th>Preschool Age</th>
<th>School Age</th>
<th>Youth</th>
<th>Working Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nutrition, psychological and cognitive stimulation, basic cognitive and social skills</td>
<td>School health and remedial education</td>
<td>Apprenticeships, skills certification, counseling</td>
<td>Intermediation services, labor regulation, social security portability</td>
</tr>
<tr>
<td>2</td>
<td>Ensuring that all students learn</td>
<td>Cognitive skills, socialization, behavioral skills</td>
<td>Vocational training, higher education, apprenticeships, targeted programs</td>
<td>Firm-provided training, recertification, reskilling</td>
</tr>
<tr>
<td>3</td>
<td>Building job-relevant skills</td>
<td>Basic vocational training, behavioral skills</td>
<td>Universities, innovation clusters, basic entrepreneurship training, risk management systems</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Encouraging entrepreneurship and innovation</td>
<td>Fostering inquiry</td>
<td></td>
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<tr>
<td>5</td>
<td>Facilitating labor mobility and job matching</td>
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</tbody>
</table>

- **Facilitating labor mobility and job matching**
- **Encouraging entrepreneurship and innovation**
- **Building job-relevant skills**
- **Ensuring that all students learn**
- **Getting children off to the right start**
Prioritizing the STEPs: Different solutions in different contexts

**Country A**
High malnutrition, poor ECD, low educational achievement

- Biggest return to STEP 1 and STEP 2

**Country B**
Weak ECD and low educational achievement among extreme poor
Weak training and innovation due to poor governance and financing

- Biggest return to STEP 3 and 4
- Targeted programs for STEP 1 and STEP 2

**Country C**
Failing labor markets in spite of substantial investments in education and training

- Biggest return to STEP 5