Supplying what demand?
Creating a high-value manufacturing sector

Panel Discussion

British Council Policy Dialogue
On Skills and Workforce Competitiveness

Mind the Skills Gap: The Case of the Philippines

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October 26, 2013

Pasig City

HUMAN RESOURCES DEMANDS AT ONE END OF THE SPECTRUM

The Philippine economy languishes between a factors-driven and an efficiency-driven stage of competitiveness according to the WEF 2012-2013 Global Competitiveness Report.

On the one hand, the absorptive capacity of such an economy for scientific talent and knowledge is limited.

On the other hand, among the measures needed to advance to the investment-driven stage and ultimately to the innovation-driven stage is to have the advanced factors consisting of highly educated scientists/engineers and research institutions.*

Obviously, the dynamics of punching through what appears to be a vicious circle has to be worked out.

*__The Competitive Advantage of Nations__ by Michael Porter

RESEARCH SCIENTISTS AND ENGINEERS (RSEs)

- Based on DOST data, the Philippines had 90 research scientists and engineers (RSE) per million population in 2002, very low compared to the UNESCO benchmark of 340 per million population.

- With a current population of about 100 million, we need to have 34,000 RSEs.

- According to DOST data, as of 2009 we had, 13,091 researchers. In 2002, the number of researchers was 7,203. Assuming a linear growth rate, the increase in the number of researchers per year is 841. Extrapolating from 2009 figures, the number of researchers by 2012 would be about 15,600.

- The current shortfall from the required 34,000 is, therefore, 18,400.

Source: Industry-Academe Collaboration for R&D, Discussion Paper, Philippine Institute for Development Studies (PIDS), Reynaldo B. Vea, 2013.

DO THE MATH...

- Assuming a constant annual increase of 841 and an annual popuation growth rate of 2%, the UNESCO benchmark will never, ever be attained. A major surge is called for.

- If we want to do it in 10 years we have to produce 2,600 PhDs every year. This assumes that we want only PhDs as researchers, for which there could be good reason.

WHERE WILL THEY COME FROM??

Source: Industry-Academe Collaboration for R&D, Discussion Paper, Philippine Institute for Development Studies (PIDS), Reynaldo B. Vea, 2013.

THE THREE NATIONAL SYSTEMS OF SCIENCE HIGH SCHOOLS

1. PSHS SYSTEM

1 campus in Diliman in 1964
15 campuses nationwide as of present

From 1969 to 2011, 14,265 graduates
- 8,166 main campus
- 6,099 all other campuses

Source: Industry-Academe Collaboration for R&D, Discussion Paper, Philippine Institute for Development Studies (PIDS), Reynaldo B. Vea, 2013.

2. Regional Science High School (RSHS) Union

- Established by the DepEd during the school year 1994-1995
- Now has 18 campuses nationwide
- Some were formerly annexes of public secondary schools Some were already established as specialized science high schools prior to 1994
- Each given by the government an allocation for Maintenance and Other Operating Expenses (MOOE) separate from other public high schools in the Philippines.

Source: Industry-Academe Collaboration for R&D, Discussion Paper, Philippine Institute for Development Studies (PIDS), Reynaldo B. Vea, 2013.

3. ESEP High Schools or the Science and Technology High Schools.

- A product of the DOST-OECD supported Engineering and Science Education Project (ESEP)
- Upon project completion they were turned over to the DepEd. They now maintain special sections for science.
- Originally numbering 100 but now totaling 198 schools

Source: Industry-Academe Collaboration for R&D, Discussion Paper, Philippine Institute for Development Studies (PIDS), Reynaldo B. Vea, 2013.

ALL TOGETHER NOW...

- The PSHS system graduates about 1,000 students every year from all campuses.

- The RSHS Union graduates about 1,700.

- As of SY 2011-2012, there were 47,776 students in the special science sections of all 4 year-levels of the ESEP High Schools. Very roughly, dividing the total by 4, there could be 10,000 graduates every year from this pool.

- Combined, the graduates from the three science high school systems number roughly 12,700 every year!

Source: Industry-Academe Collaboration for R&D, Discussion Paper, Philippine Institute for Development Studies (PIDS), Reynaldo B. Vea, 2013.

AND THEN SOME...

- A good number of cities and municipalities have their own science high schools.

- Furthermore, there are private science high schools.

MARSHALLING OUR RESOURCES ...

- To get the 2,600 PHDs we need every year we can turn to the three national science high schools systems, which together graduate about 12,700 students every year!

- We can get additional talent from the city/municipal science high schools, the private science high schools, and from non-science high schools.

Source: Industry-Academe Collaboration for R&D, Discussion Paper, Philippine Institute for Development Studies (PIDS), Reynaldo B. Vea, 2013.

MARSHALLING OUR RESOURCES ...

- As of 2006, there were 50 higher education institutes offering master's degree programs in engineering and the sciences. There are only 7 Philippine schools offering PhD programs in engineering. Probably just as few schools in the natural sciences .

- The numbers of graduates produced by the ESEP and ERDT, which are an order of magnitude or two less than required, concretely demonstrate the inadequacy of local educational resources.

- This means that if wanted to attain the UNESCO benchmark we have to depend heavily on sending scholars to schools abroad at least at the start. The expenses would increase considerably. However, we should be able to plan for it if we mean to do it.

Source: Industry-Academe Collaboration for R&D, Discussion Paper, Philippine Institute for Development Studies (PIDS), Reynaldo B. Vea, 2013.

HUMAN RESOURCES DEMANDS
AT THE OTHER END OF THE SPECTRUM

THE THREE ENGINEERING OCCUPATIONS

A professional engineer deals with *complex* engineering problems; an engineering technologist deals with *broadly-defined* engineering problems; and an engineering technician solves *well-defined* engineering problems.

Source: ***Philippine Curricula for Engineering Technologist and Engineering Technician Degree Programs***, Reynaldo B. Vea, National Academy of Science and Technology (NAST), Republic of the Philippines, April 2014.

ELEMENTS OF CURRICULA AND COURSES

Differentiating Characteristic	Curricula & Course Elements	Professional Engineer	Engineering Technologist	Engineering Technician
Problem Analysis	First principles	■		
	Analytical tools	■	■	
	Codified methods	■	■	■
Design	Complex problems	■		
	Broadly-defined problems	■	■	
	Well-defined problems	■	■	■
Design of systems, components or processes	Design	■		
	Contribute to design	■	■	
	Assist with design	■	■	■

Source: ***Philippine Curricula for Engineering Technologist and Engineering Technician Degree Programs***, Reynaldo B. Vea, National Academy of Science and Technology (NAST), Republic of the Philippines, April 2014.

ELEMENTS OF CURRICULA AND COURSES

Differentiating Characteristic	Curricula & Course Elements	Professional Engineer	Engineering Technologist	Engineering Technician
Considerations in design, solutions, professional work and practice: public health and safety, cultural, societal, environmental, sustainability, ethical and legal	Contextualize, apply & assess	■		
	Understand	■	■	■
Investigation	Research literature	■		
	Technology literature	■	■	
	Design, conduct experiments	■	■	
	Data bases	■	■	
	Codes of practice	■	■	■
	Catalogues	■	■	■

Source: ***Philippine Curricula for Engineering Technologist and Engineering Technician Degree Programs***, Reynaldo B. Vea, National Academy of Science and Technology (NAST), Republic of the Philippines, April 2014.

ELEMENTS OF CURRICULA AND COURSES

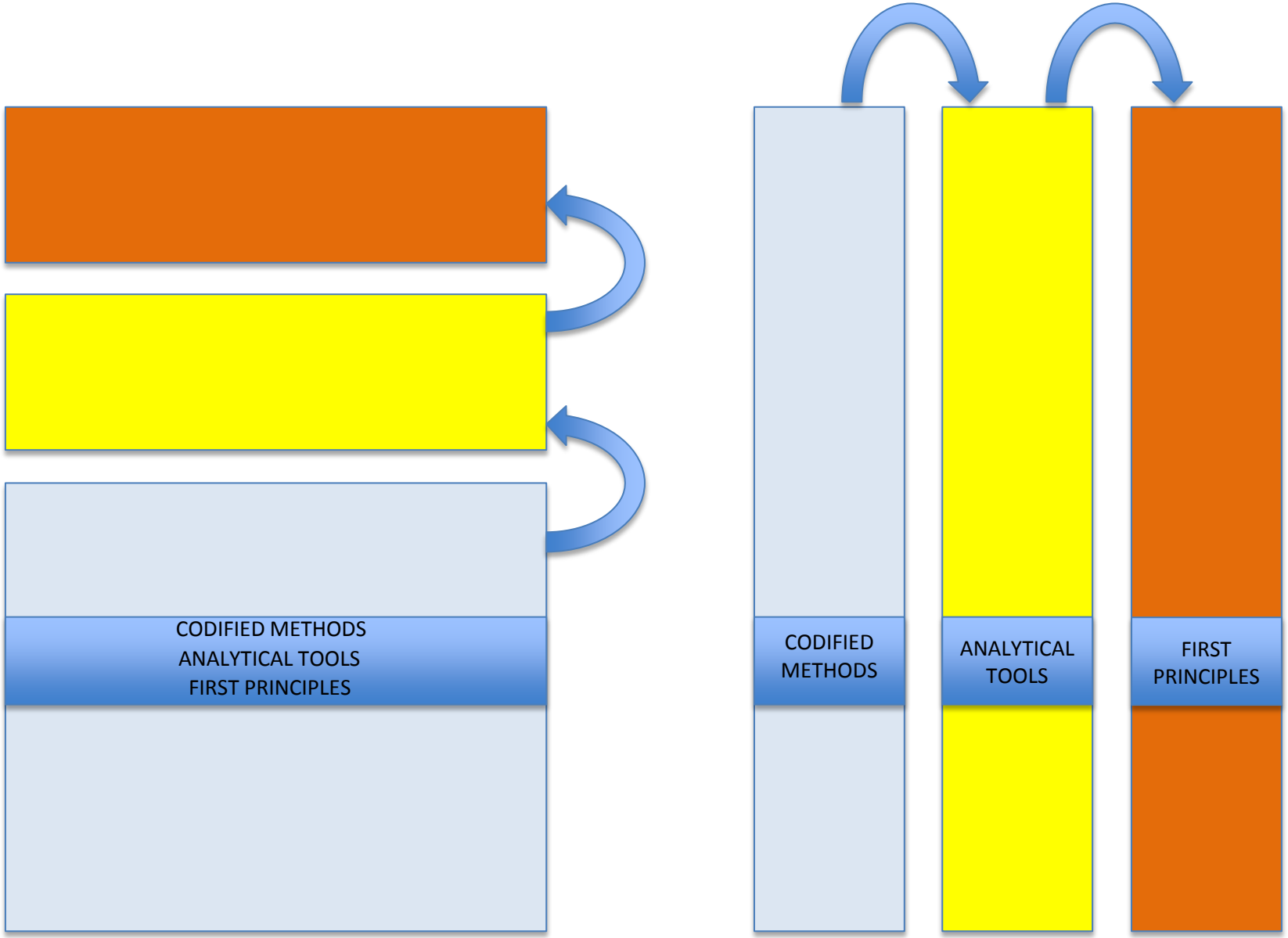
Differentiating Characteristic	Curricula & Course Elements	Professional Engineer	Engineering Technologist	Engineering Technician
Modern Engineering & IT Tool Usage	Create	■		
	Prediction & modeling	■	■	
	Select	■	■	
	Apply	■	■	■
Individual and Team work	Multi-disciplinary	■		
	Leader	■	■	
	Member	■	■	■
	Individual	■	■	■
Communication	Write reports	■	■	
	Make presentations	■	■	
	Comprehend reports	■	■	■
	Design documentation	■	■	■
	Give & receive instructions	■	■	■

Source: ***Philippine Curricula for Engineering Technologist and Engineering Technician Degree Programs***, Reynaldo B. Vea, National Academy of Science and Technology (NAST), Republic of the Philippines, April 2014.

ELEMENTS OF CURRICULA AND COURSES

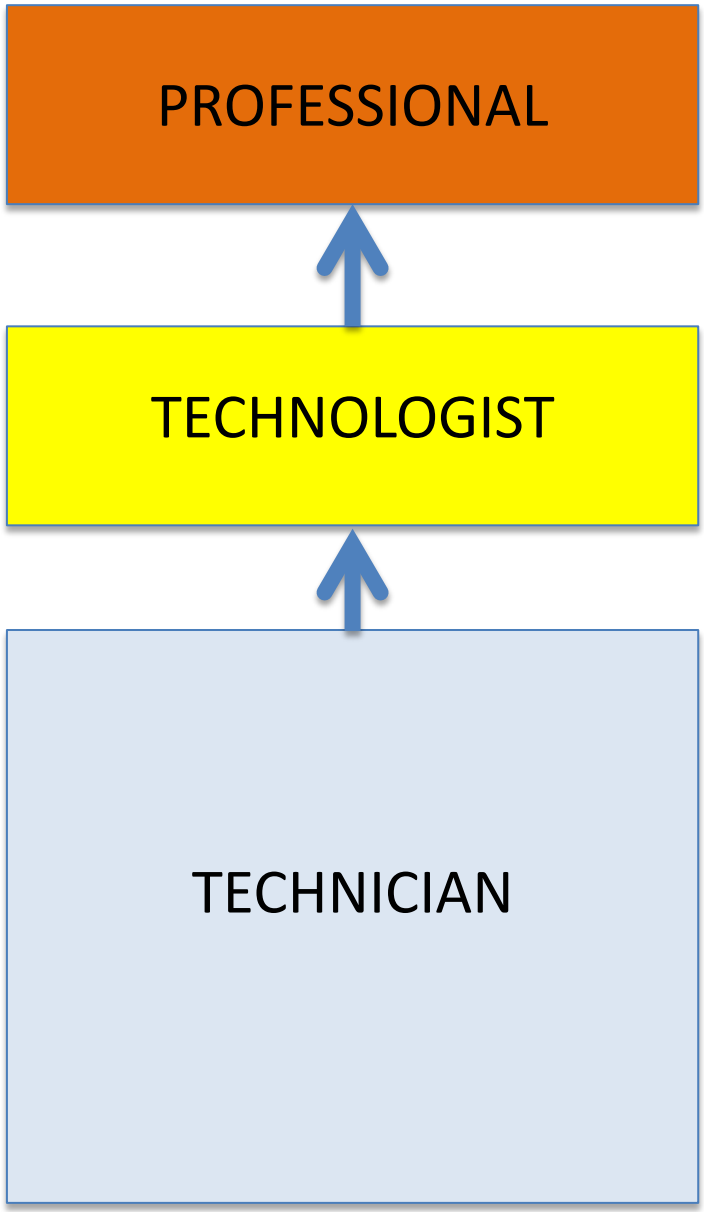
Differentiating Characteristic	Curricula & Course Elements	Professional Engineer	Engineering Technologist	Engineering Technician
Project Management and Finance	Economic decision-making	■		
	Engineering management	■	■	■
	Team work	■	■	■
	Multi-disciplinary	■	■	■
Independent Lifelong learning	Broadest aspect of technological change	■		
	Specialist technologies	■	■	
	Specialized technical knowledge	■	■	■

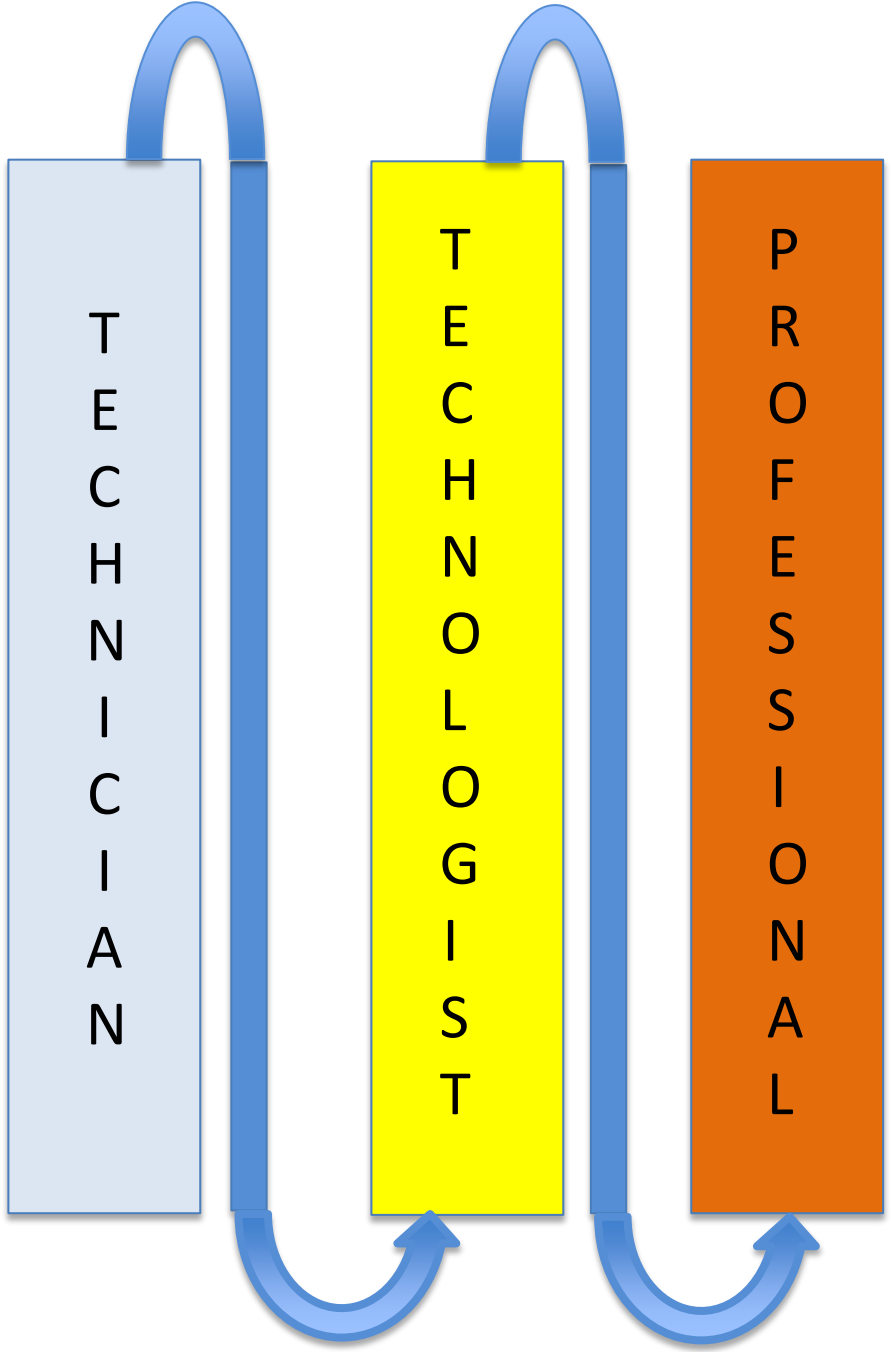
Source: ***Philippine Curricula for Engineering Technologist and Engineering Technician Degree Programs***, Reynaldo B. Vea, National Academy of Science and Technology (NAST), Republic of the Philippines, April 2014.



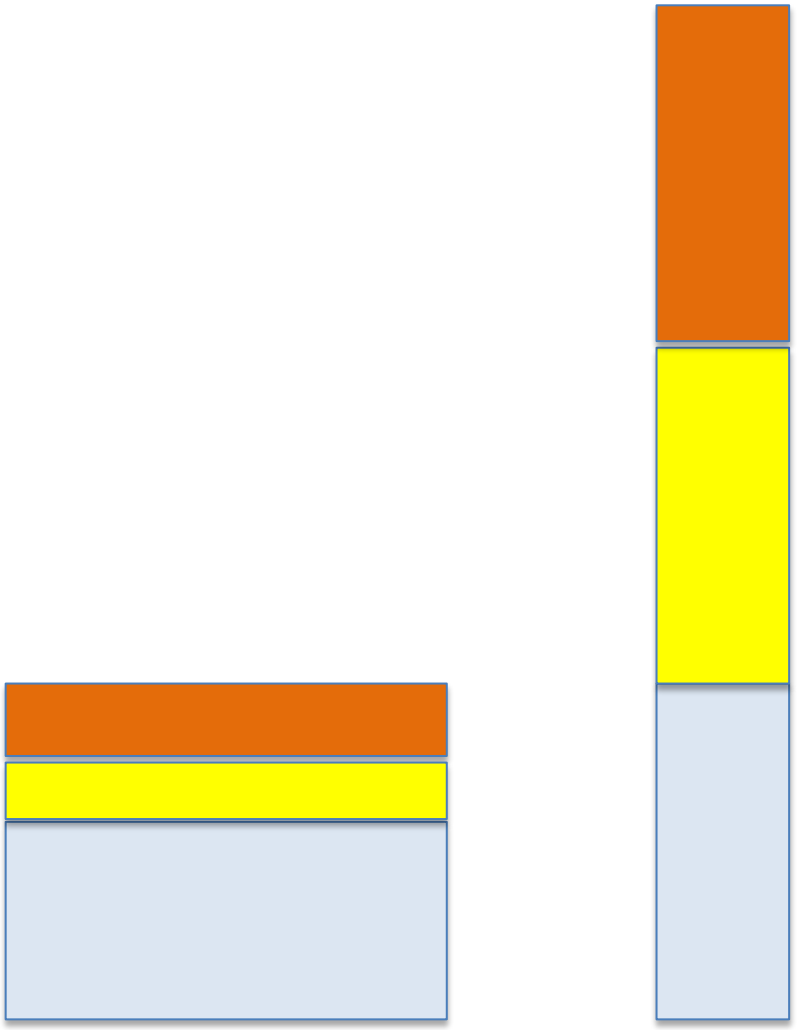
BREAKING UP INDIVIDUAL COURSES

Source: ***Philippine Curricula for Engineering Technologist and Engineering Technician Degree Programs***, Reynaldo B. Vea, National Academy of Science and Technology (NAST), Republic of the Philippines, April 2014.





RESTRUCTURING THE LADDER



RESTRUCTURING THE LADDER

Source: ***Philippine Curricula for Engineering Technologist and Engineering Technician Degree Programs***, Reynaldo B. Vea, National Academy of Science and Technology (NAST), Republic of the Philippines, April 2014.

THANK YOU!!