

On the Future S&T Human
Resource Requirements in the
Philippines:
A Labor Market Analysis

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Focus on the Supply Side:

Strengthening the Basic Sciences
and Mathematics

Revitalize Pre-service Teacher
Education

Graduate Education Reform

THE NEW MACHINE AGE

(Second Machine Age)

Prof. Erik Brynjolfsson

Director of MIT Center for Digital Business

- **Digital**- quantitative, measurable, freely replicable, near zero transport cost
- **Exponential**-fast, rapid development but we still expect linear trends
- **Combinatorial**- partnerships, team up with machines; human-computer cooperation; infrastructure systems

A country's advantage comes from its choices, not from the DNA of its people.

Pink, 2008. Harvard Business Review

Strengthening the Basic Sciences and Mathematics

Mathematics

Biology

Chemistry

Physics

Earth Sciences

Social Sciences

Value of Research in the Basic Sciences

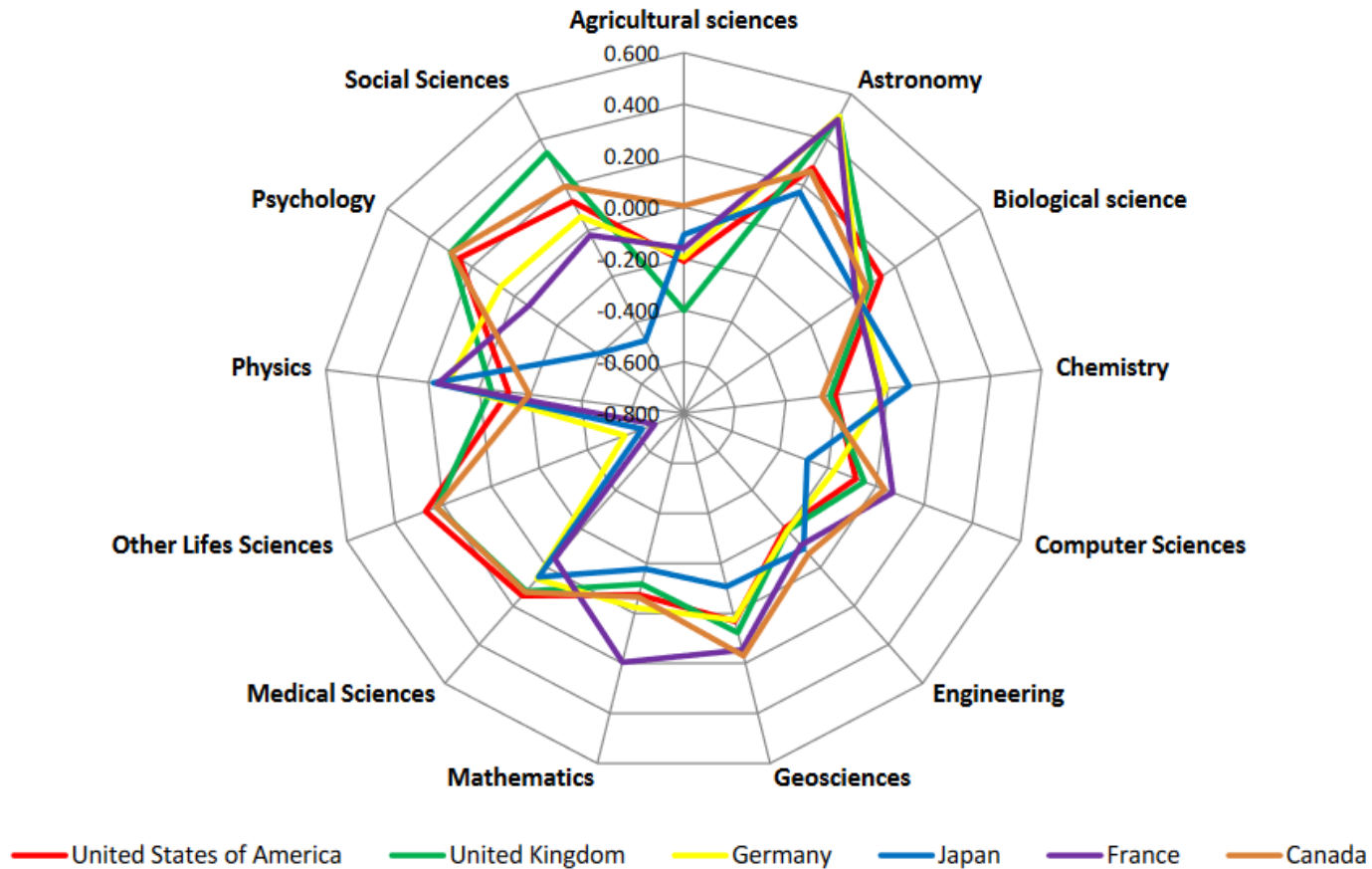
- *Certainly, one might speculate idly whether **transistors** might have been discovered by people who had not been trained in and had not contributed to **wave mechanics or the quantum theory of solids**. It so happened that the inventors of transistors were versed in and contributed to the quantum theory of solids. (Casimir, 1966)*
- *The **genome** maps would not have been possible without the discovery of the **structure of DNA***
- *Many **new materials** of common use such as plastics and biopolymers were discovered through basic research in **chemistry**.*
- *Or whether, in an urge to provide **better communication**, one might have found **electromagnetic waves**. They weren't found that way. They were found by Hertz who emphasised the beauty of physics and who based his work on **the theoretical considerations of Maxwell**. I think there is hardly any example of twentieth century innovation which is not indebted in this way to basic scientific thought. (Casimir, 1966)*

Basic Sciences and Mathematics Programs (Figures denote number of HEIs offering the program)

Bachelor of Science – 381	Master of Science-208	Doctor of Philosophy-50
General Mathematics-183	General Mathematics-55	General Mathematics-8
Applied Mathematics-20	Applied Mathematics- 5	
General Science-19	General Science-10	General Science-1
Natural Science-1	Natural Science-1	
Other Natural Science-	Other Natural Science-3	
Applied Science-1	Applied Science-1	
Physics-22	Physics-13	Physics-5
Applied Physics-9	Applied Physics-2	
Physics-Mathematics-1		
Chemistry-58	Chemistry-32	Chemistry-7
Biochemistry-5	Biochemistry-2	Biochemistry-2
Biology-184	Biology-46	Biology-12
Botany-5	Botany-2	Botany-1
Zoology-7	Zoology-1	
Entomology	Entomology-4	Entomology-4
Microbiology-1	Microbiology-4	Microbiology-1
Molecular Biology and Biotechnology-1	Molecular Biology and Biotechnology-4	Molecular Biology and Biotechnology-2
Genetics	Genetics-2	Genetics-1
Marine Biology-22	Marine Biology-6	Marine Biology-2
Marine Biodiversity	Marine Biodiversity-3	Marine Science-1
Marine Science	Marine Science-2	
Human Biology-3	Physiology-1	
Biological Science-7	Biological Science-5	Biological Science-1
Geology-8	Geology-1	
Astronomy-3	Astronomy-1	Geology-1
Oceanography	Oceanography-1	
Meteorology-4	Meteorology-1	Meteorology-1

Source: [Vea, 2020](#)

Figure 4.2 Trends in scientific specialization, 2008–2014: High-Income Countries



Revitalize Pre-Service Teacher Education

State of Philippine Education: Where are We Now and Where are We Going?

*Rosario G. Manasan
Asian Development Bank
3 November 2016*

Performance of First Timers and Repeaters in the March 2019 Teacher's Licensure Exam

SEQ. NO.	SCHOOL	FIRST TIMERS				REPEATERS				OVERALL PERFORMANCE			
		PASSED	FAILED	TOTAL	% PASSED	PASSED	FAILED	TOTAL	% PASSED	PASSED	FAILED	TOTAL	% PASSED
1405	WESTERN MINDANAO STATE U- ZAMBOANGA DEL NORTE AGRICULTURAL COLLEGE	0	0	0	0.00%	0	1	1	0.00%	0	1	1	0.00%
1406	ZAMBOANGA DEL SUR AGRICULTURAL COLLEGE- DUMINGAG	0	0	0	0.00%	1	6	7	14.29%	1	6	7	14.29%
1407	ZAMORA MEMORIAL COLLEGE	0	9	9	0.00%	11	43	54	20.37%	11	52	63	17.46%
1408	ZARAGOSA COLLEGE	0	0	0	0.00%	0	4	4	0.00%	0	4	4	0.00%
OVERALL TOTAL		5,078	7,824	12,902	39.36%	14,581	44,567	59,148	24.65%	19,659	52,391	72,050	27.29%
XXXXXXXXXXXX NOTHING FOLLOWS XXXXXXXXXXXXXXX													

41,930 examinees pass March 2019 teacher's licensure exam -- PRC | Inquirer News

Issues related to teacher competencies

- ❑ Knowledge of subject matter among elementary and high school teachers (as indicated by their performance on content knowledge diagnostic tests) is low in most subjects
- ❑ Self-assessments of teachers' strengths and weaknesses may not be a good basis on which to plan professional development activities
- ❑ Need for high quality and regular professional development programs to address the weaknesses in the competencies of the existing teacher workforce

Issues in TVET – Quality of TVET graduates

- ❑ Some improvement in certification rate – 88% in 2013
 - Likewise, in proportion of graduates assessed – 60%
- ❑ Low employability of graduates of technical and vocational education institutes (65% in 2013) -indicative of the low quality of TVET
- ❑ Low quality of training provided by TVEIs reported to be more pronounced in private institutions
 - associated with the lack of qualifications of trainers and the inadequacy of equipment and facilities
- ❑ relevance of TVE is held back by the limited range of course offerings and the use of outdated or low quality equipment
 - unable to familiarize students with new technologies used in the workplace

Quality of instruction in HEIs generally low

Passing rate in Licensure Examinations

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
SUCs (with UP)	34.5	38.8	36.6	38.3	35.2	32.4	35.7	47.4	42.3	40.6	39.9
PHEIs	36.1	38.5	39.1	39.0	36.7	34.5	36.1	40.0	37.1	39.0	38.7
All HEIs	35.6	38.6	38.4	38.8	36.3	34.0	35.9	42.6	39.2	39.8	39.3

- ❑ Median passing rates for professional board examinations (PBEs) ranged from low of 34% to a high of 43% in 2005-2015
 - only 10 out of these 38 PBEs had average passing rates above 60% and only 6 have passing rates above 70%
- ❑ On the average, PHEIs performed better than SUCs in 2005-2011; reverse is true in 2012-2015 but edge of SUCs declining
- ❑ More worrisome is preponderance of HEIs (both SUCs & PHEIs with zero passing rate in many PBEs) → indicative of large number of low quality HEIs in both public and private sector

Strengths and Weaknesses Affecting Competitiveness (out of 141 countries) 2019

Philippine **domestic economy** (12th), **tax policy** (14th), and labor market (10th) were among the best in the world.

However, all other indicators such as **basic infrastructure** (61st), health and environment (56th), **education** (58th), scientific infrastructure (59th), business legislation (54th), and international trade (54th) showed that the Philippines has a lot of catching up to do.

2019 Global Talent Competitiveness Index : Philippines (out of 125)

- Sub-standard Formal Education (85th)
- Weak Sustainability (88th)
- Weak in Lifestyle (91st)
- Low Ability to Retain Talent (92nd)

Re-envision and reform Graduate Education

Anchor graduate degree programs on reputable
sustainable research expertise

Terminate poorly-performing programs

Exercise caution in institution new programs and in
partnering with offshore institutions

Actively recruit and develop highly-qualified faculty in STEM

Consider hiring foreign faculty and researchers

Institute attractive compensation package

Maintain functional basic science and mathematics departments

Improve and expand Graduate Programs in the basic
sciences and mathematics

Strong science and mathematics base influences
quality of instruction and research in STEM

Provide opportunities for the faculty to retool

Support post-doctoral research postings in other
institutions

Support attendance to and participation in
international STEM conferences

Establish a highly-efficient research management system

Research data management

IPR

Scientific fraud

Financial Management

Procurement

Engage highly-trained
STEM staff in the
Development of the K-12
STEM Curriculum and their
corresponding instructional
materials

No simple law of Nature makes technology the cause of economic growth or growth the cause of technological advance.

The interplay of people, economic institutions, growing markets and technology is the key.

Rosenberg and Birdzell, 1990



Thank you