Making Skills Development Work For The Future

Asia-Pacific Conference on Education and Training 2015

(ACET 2015)

Venue: Berjaya Times Square Hotel, Kuala Lumpur
Date: 3-5 August 2015
Greening Skills: How TVET Institutions are Responding in the Philippines

A Study Presented by:
Dir. Felicidad B. Zurbano
Director III, TESDA, Philippines

ACET Session: Greening TVET and Skills: Responses from the Asia-Pacific Region
Philippine Government Policies

Construction
- RA 6969: Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990
- RA 9367: Biofuels Act of 2007
- RA 9513: Renewable Energy Act of 2008 (PV System Installer, Designer and Maintenance)

Agriculture
- RA 8435: Agriculture and Fisheries Modernization Act of 1997 (Farm Mechanic, Farm Machinery Operator)
- RA 10068: Organic Agriculture Act of 2010 (Organic Farming, Vermiculturist, Hydroponics growers, Vertical Gardening, Landscape Gardening)

Environmental Awareness
- RA 9512: Environmental Awareness and Education Act of 2008
- RA 9729: Climate Change Act of 2009

Environmental Protection
- RA 8749: Philippine Clean Air Act of 1999
- RA 9003: Ecological Solid Waste Management Act of 2000 (Spotter, Site Forman, Palero)
- RA 9275: Clean Water Act of 2004

Without TVET Programs Available
TVET Example/s
Mainstreaming Green Skills

1. Agriculture
   21 With Training Regulations (WTR) Programs
   5 No Training Regulations (NTR) Programs

2. Construction
   43 With Training Regulations (WTR) Programs
   23 No Training Regulations (NTR)

3. HVAC-RAC Programs are updated

4. 5S is included in all TRs

5. 5S is a critical aspect of all qualifications; is assessed

6. Maintain Training Facilities under Trainers Methodology Level I; a must for all TVET trainers
Green Survey Results

Figure 1. Reasons/Motivations for Greening Skills in Construction and Agriculture Sector

- National and Environmental Regulations
- Government Initiatives in Skills Development
Teachers and students in construction and in agriculture surveyed agree (mode=2) that

- Cognitive
- Technological
- Interpersonal
- Intrapersonal competencies; and
- positive behaviors towards the environment are acquired during training.
Green Survey Results

- Transition to greater use of products and services that increase energy efficiency
- Transition to greater use of processes that reduce/remove pollution or greenhouse gas
- Transition to greater use of products and services that comply with environmental regulations and standards

Figure 2. Changes or Motivations in Programmes to Teach/Train Green Skills
Green Survey Results

Figure 3. Barriers to Teaching Environmental Skills

- National Level
  - emphasize teaching environmental skills within qualifications

- School Level
  - create awareness/expose
  - capacitate
Policy Implementation

Limited Training Programs/Providers:

*Technicians*
- Methane/landfill gas generation system
- Biofuels processing
- Biomass plant
- Wind turbine service
- Hydro electric plant
- Geothermal
- Edible vertical garden

*Workers*
- Air/water pollution control
- Methane/landfill gas collection system
Potentials of Skills Top-Up

Add

Vermiculture

Update

Inverter Technology

Merge

Agri-Tourism

Specialize in “Green Skills”

TESDA Green Technology Center (GTC)
Thank You

www.tesda.gov.ph

ACET Session: Greening TVET and Skills: Responses from the Asia-Pacific Region
Making Skills Development Work For The Future

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Greening TVET and Skills in Sri Lanka

Presented by
Nadeesh De Silva
Tertiary and Vocational Education Commission, Sri Lanka

ACET Session: Greening TVET and Skills: Responses from the Asia-Pacific Region
Tertiary and Vocational Education Commission (TVEC)

- Policy Formulation, Planning, Quality Assurance, Coordination and Development of Tertiary and Vocational Education.
- Maintenance of Labour Market Information for TVET sector
- Awarding National Vocational Qualification (NVQ)
- Maintenance of Academic and Training Standards for TVET sector

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National Policies for Green Skills

- National Environment policy
- National Policy and Strategy on Cleaner Production for Agricultural Sector
- National Watershed Management policy
- Basic Competencies to Work course has been introduced as NVQ 1 course
- Installing Quality Management System which focuses processes related to environmental friendly practices in TVET.
Courses of Green Content in Construction Industry

- Drafting Technology
- Construction Technology
- Aluminum Fabricator
- Assistant Quantity Surveyor
- Construction Craftsman (Masonry)
- Wood Craftsman (Building)
- Bar Bender
- Painter (Building)
- Construction Site supervisor
- Draughtsperson
The Impact of Greening Skills from Students Perceptions

**Impact on Increasing Opportunity to find a Job**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
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<td></td>
<td>51.0</td>
<td>15.7</td>
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</table>

**Help to contribute more Environmental Friendly Practice at Work**

<table>
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<td>54.9</td>
<td>11.8</td>
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<td>2.0</td>
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</tbody>
</table>

**Help to Contribute to More Greening of Community**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Strongly Agree</th>
<th>Agree</th>
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<td></td>
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</table>

**Help in Life**

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<th>Undecided</th>
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<th>Strongly Disagree</th>
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<td>41.2</td>
<td>11.8</td>
<td>2.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>
The Impact of Greening Skills from Teachers' Perceptions

Student Employability

Advancing Skills for Protecting Environment

Increasing the Ability to Work in Other Sectors

Providing New Occupations for Rural Workforce
The Reasons for Greening Skills in TVET Programmes

- **International Regulations**: 33.3% Strongly Agree, 66.7% Other

- **National Environmental Regulations**: 62.5% Strongly Agree, 25% Agree, 12.5% Other

- **Government Initiatives in Skills Development**: 87.5% Other, 12.5% Other

- **Rules and Regulations in Industry**: 62.5% Other, 25% Agree, 12.5% Other
The Reasons for Greening Skills in TVET Programmes

Cont...

![Pie chart showing the reasons for greening skills in TVET programmes.](chart.png)
Barriers to Teach Green Skills

National Level

Percentage

Strongly Agree: 40
Agree: 20
Undecided: 13.3
Disagree: 13.3
Strongly Disagree: 13.3

Professional Level

Percentage

Strongly Agree: 20.8
Agree: 21.7
Undecided: 27.5
Disagree: 30
Strongly Disagree: 0

School Level

Percentage

Strongly Agree: 37.5
Agree: 25
Undecided: 25
Disagree: 12.5
Strongly Disagree: 0
Thank You.
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Date: 3-5 August 2015
Key results of Greening Skills Research Study in Mongolia

UNEVOC Center & Institute of Educational Research, MECS, Mongolia

ACET Session: Greening TVET and Skills: Responses from the Asia-Pacific Region
National Policy in Green development

- “Green development concept and mid term program” approved by the Parliament (2014)
- 72 resolutions and regulations on environmental protection and SD were developed by the GoM (2012-2015)
- National Program on Ecological Education (1997)
- National Program of the Public Ecological Education for 2009-2019
- “Ecological education” Program: “National Program of Education for Sustainable Development for All”
Economic development

Priority area:

- Mining
- Construction
- Agriculture

Current situation: pollution, desertification, less of the grazing land for the pastoral monadic herding, ecological problems, environment is not healthy and started to be toxic, no sustainable future for all humans and animals and nature in general.
1. Study on Greening VET in Mongolia (UNESCO Beijing office)

- Study analyze the legal and regulatory framework regarding the promotion of green jobs and green skills VET, curricula and programs, needs and further recommendations
- Develop handbook on Green VET for teachers and stakeholders

2. UNEVOC Bonn Centre Green Skills study on agriculture and construction.

- Identification of the present skills gaps, to transitions into: sustainable societies, low-carbon economies and to successful ASEAN economic community (AEC);
- To map the existing practices of vocational training providers/TVET institutions, analyze the correlation of present provisions
TVET and Green development in Mongolia - study results

How are green skills are included in programs:

- More than 60% of students don’t have clear understanding
- 25-33% of teachers thinking that additional skills/competences included in their programs

Conclusion:

- courses do not meet new green skills requirements
- content on greening skill is still lacking in the curricula
TVET and Green development in Mongolia - study results

• 58 % of teachers agreed that the schools can make changes in training programs
• 54 % of teachers agreed that the internal collaboration is important
• 61 % of them considered that external collaboration should be involved (partnership)
• 60 % of teachers respecting International training standards as motivations for greening skills in programs
Study result

Barriers to teaching environmental skills
• 38.9-54.2 % of teachers considered that barriers to teaching GSs exist at national level,
• 40.0 – 56.0 % replied “at school level”
• 28.0 – 38.9 % at personal level

Teachers training:
• 48 % - schools provide teachers trainings by them self
• 71% replied that training are organized by the industry at the institute.
• 41 % trainings are provided by projects
Conclusions

• The online survey results show that technical skills of teachers and students is high and there is an opportunity for developing online training and on-line studies for the further
• UNESCO and UNEVOC IC initiatives can motivate VET Policy makers and TVET providers to take attention on Green TVET
• Sustainable green development policy is reflected in national policy documents and laws of Mongolia, there is no policy on greening TVET development
• Survey confirm that current training programs don’t meet requirements of greening skills demand for the Green economy development
• Green activities are limited and very basic focus mainly on tree planting, vegetables in greenhouses and gardening. No clear knowledge and understanding on green concept
Recommendations

• Carry out more in-depth research study on green training programs, methods of the content improvements
• Include Green Development concept on TVET teachers training programs
• Facilitate greening skills development at policy level
• Include Green concept in TVET standards, reforming training content in different occupations
• Coordinate green skills development task with the employers requirement and professional associations support
• Involve teachers in international projects and programs
• Learn from the experiences of other countries
Thank you for your attention !!!!
Making Skills Development Work For The Future

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Date: 3-5 August 2015
MALAYSIA: GREENING TVET AND SKILLS

Presentation By

DATUK HAJI MOHLIS BIN JAAFAR
DIRECTOR GENERAL
DEPARTMENT OF POLYTECHNIC EDUCATION
MINISTRY OF EDUCATION MALAYSIA
Contents

- Introduction
- Government Policy
- Greening TVET
- PolyGreen Blueprint
- Report on Greening Skill Study – Malaysia
- Conclusion
Introduction

Green Technology shall be a driver to accelerate the national economy and promote sustainable development.

Polytechnics play a critical role in curtailing global warming and providing green collar workers to build a more sustainable Malaysia.

Our commitment requires vision, perseverance, creativity, innovation and a willingness to adopt new practices.
Government Policy on Green Technology
Establishment of the Ministry of Energy, Green Technology And Water (KETTHA) in April 2009

Launching of the national green technology policy on 24th July 2009

Preparation of a green technology master plan, which details the strategic direction of the country in the implementation of green technology

“I would also like to announce here in Copenhagen that Malaysia is adopting an indicator of a voluntary reduction of up to 40% in terms of emissions intensity of GDP by the year 2020 compared to 2005 levels. This indicator is conditional on receiving the transfer of technology and finance of adequate and correspond to what is required in order to achieve this indicator”

Prime Minister in Copenhagen, November 17, 2009
In his speech at the Malaysia Greentech Awards 13th October 2012, former Deputy Prime Minister Tan Sri Muhyiddin Yassin urged that:

The Education Ministry planned, formulated and integrated a course on green technology into the syllabus.

Public and private institutions of higher learning should also offer more courses on green technology to meet market demands in the country.
Definition of Green Technology

The development and application of **products, equipment and systems** used to conserve the natural environment and resources, as well as minimize and reduce the negative impacts of human activities.
Criteria of Green Technology

- Minimizes degradation of the environment
- Has zero or low green house gas (GHG) emission
- Is safe for use and promotes healthy and improved environment for all forms of life
- Conserves the use of energy and natural resources
- Promotes the use of renewable resources
The National Green Technology Policy (launched on the 24th July 2009) outlines **five strategic thrusts**, namely:

- **ST 1** Strengthen the Institutional Framework
- **ST 2** Provide Conducive Environment for Green Technology Development
- **ST 3** Intensify Human Capital Development in Green Technology
- **ST 4** Intensify Green Technology Research and Innovations
- **ST 5** Increase Promotion and Public Awareness

**5 Strategic Thrusts**
5 Objectives:

- Minimise growth of energy consumption while enhancing economic development
- Facilitate the growth of green technology industry to enhance its contribution to national economy
- Increase national capability and capacity for innovation in green technology development & enhance Malaysia’s competitiveness in global arena
- Ensure sustainable development & conserve environment for future generations
- Enhance public education & awareness on green technology and encourage its widespread use
Malaysia’s Green Growth Strategy will lead to:

- Better quality of growth
- Strengthened food, water and energy security
- Lower environmental risks and ecological scarcities
- Better wellbeing and quality of life
- Significant reduction in greenhouse gas emissions
- Improved conservation of terrestrial and inland water, coastal and marine ecosystems
GREENING TVET
Former Deputy Prime Minister Tan Sri Muhyiddin Yassin launched the PolyGreen Blueprint on April 1st, 2015. This initiative is an important stepping stone to elevate polytechnics’ image. The Blueprint are being implemented at all polytechnics nationwide. This effort is also in line with the Government’s aspiration to reduce the country’s carbon emissions by 40 percent by 2020.
A blueprint of green practices are to be implemented at all polytechnics nationwide

A long-term sustainable system to address the worsening climate change

Based on the 6R principals of Reuse, Reduce, Renew, Recycle, Repair and Rethink

Polytechnic graduates will become agents of change, leading green technology in their future careers

Aiming to improve the polytechnics’ environmental footprint, enhancing the quality of life on campus while streamlining the system and processes to save resources, time and money
10 Focus Areas

- Green Procurement
- Change Management & Communication
- Diversity & Landscape
- Air Quality
- Transportation
- Water Management
- Waste Management
- Environmental Management
- Energy Management
- Climate Change
Success Stories

MALACCA MERLIMAU POLYTECHNIC

Energy Management Program with TaiAce Engineering under GreenTech Malaysia supervision has been implemented by the Energy Management Committee at PMM to reduce electricity consumption.

PMM is the first government institution that implements energy saving in the buildings using Energy Performance Contract (EPC).

Three objectives are established based on PMM Energy Policy:

1. To create an efficient energy management system to improve energy efficiency and reduce utility costs;

2. To reduce carbon emissions through efficient energy management in compliance with national and international standard; and

3. To strive for Gold Standard in ASEAN Energy Management Scheme (AEMAS).

In January 2013, PMM has received One Star Certification and recognition under the ASEAN Energy Management Gold Standard (EMGS).

This recognition shows that fixed-width management is committed to implement energy efficiency by adopting energy saving initiatives.
Success Stories
SULTAN AZLAN SHAH POLYTECHNIC (PSAS)

PSAS has established and implemented Energy Management Program with TaiAce Engineering under GreenTech Malaysia supervision since early this year - 2015.

PSAS also collaborates with the Malaysian Green Technology Corporation to achieve ASEAN Energy Management Certification Scheme (AEMAS) - Energy Management Gold Standard.

The cooperation also includes the establishment and continuous improvement of the implementation of the Sustainable Energy Management System PSAS, and strengthening of research, innovation and science for commercial and partnership with the industries in the field of energy among students and lecturers.
PSIS has taken initiatives to provide **Entrepreneurial Incubator Collecting Used Cooking Oil** to create eco-friendly ecological system and free disposal of used cooking oil.

The program aims to improve the ecological system of contaminated used oil waste recycling, in addition to innovation of used oil into **biodiesel** that can be used by diesel vehicles.

**Green Park PSIS** is designed to be a platform for students and staff for an active learning out of the classroom boundaries. In addition, it can provide a comfortable space and activities during recess time before or after class.

**Green Park PSIS** is also equipped with **Rain Water Harvesting System**, **Solar Panel** and **WIFI coverage** for students to surf the internet.
MALAYSIA-Report on Greening Skills Study
### Demography

**No. of Polytechnics Participated:** 6

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>LECTURERS</th>
<th>STUDENTS</th>
</tr>
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<tbody>
<tr>
<td>Respondents</td>
<td>13 (Full time)</td>
<td>80 (Full time/Final year)</td>
</tr>
<tr>
<td>Working Experience</td>
<td>1 - 23 years</td>
<td>-</td>
</tr>
<tr>
<td>Age</td>
<td>30 - 39 years old</td>
<td>18 - 25 years old</td>
</tr>
<tr>
<td>Students’ Background</td>
<td>-</td>
<td>Dip. In Environmental Engineering, Bachelor of Facility Management, Dip. In Civil Engineering, Dip. in Agro Technology, Dip. In Landscape Horticulture.</td>
</tr>
<tr>
<td>Subject Taught (Selected)</td>
<td>Waste Management, Modern Agriculture, Technology Building, Services Workshop, Facility Management, Hydrographic, Highway Engineering, etc.</td>
<td></td>
</tr>
</tbody>
</table>
Main Reasons or Motivation for Greening Skills

**Conclusion:**
- Lecturers strongly agree that international regulations and government initiatives in Skills Development are reasons or motivation for integrating the greening skills in their TVET programmes.
Conclusion: All lecturers (strongly agree/agree) that Green intervention has impact on students’ employability, promoting self-employment, advancing skills, ability to work in other trades/sectors, etc.
Cognitive competencies developed by students through lecturers’ teaching

How everything is connected
- Agree: 36.4%
- Strongly Agree: 63.6%

How to deal with complexity
- Agree: 36.4%
- Strongly Agree: 63.6%

How to think about things differently
- Agree: 45.5%
- Strongly Agree: 54.5%

Innovation skills to identify opportunities and create new strategies for green challenges
- Agree: 45.5%
- Strongly Agree: 54.5%

Environmental awareness and willingness to learn about sustainable development
- Agree: 45.5%
- Strongly Agree: 54.5%

Conclusion:
All lecturers strongly agree/agree that lecturers’ teaching has impact on the students’ cognitive competencies such as environmental awareness, innovation skills, and how to deal with complexity, etc.
Conclusion:
All lecturers strongly agree/agree that lecturers’ teaching has impact on students’ technological competencies such as skills contributing to greening industries, environmental laws and regulations, and what can be recycled, etc.
Report on Greening Skills study (Lecturers)

Barriers to teaching environmental skills

- It is not in my curriculum
- I do not have the skills
- There are less (or none at all) demand for such skills
- The development of ‘green attitude’ among staff is not part of our administration initiative
- Assessment mechanisms are not in place
- There is no means to certify environmental skills in existing qualification standards

Conclusion:
- 46.2% agree that assessment mechanisms are not in place and there is no means to certify environmental skills in existing qualification standards
- 69.2% disagree that environmental skills content is not in the curriculum and they don’t have the skills to teach
- 38.5% strongly agree and 15.4% agree that the development of ‘green attitudes’ among staff is not part of their administration initiative.
Conclusion:

- 68.8% and 61.3% agree they learn green skills through health and safety modules and general subjects.
- 22.4% and 21.2% disagree that they learn green skills during industry placement and extracurricular activities.
- 28.8% strongly agree that green skills are learnt during activities for communities that deal with environmental issues.
Report on Greening Skills study (Students)

Cognitive Competencies on greening skills

Conclusion:
- 58.8% and 56.3% agree that how everything is connected and environmental awareness developed their cognitive competency.
- 31.3% and 26.3% strongly agree that innovation skills and how to deal with complexity enhanced their cognitive competency.
- Only 16.2% and 13.7% disagree that how to deal with complexity and innovation skills as well as environmental awareness developed their cognitive competency.
### Technological Competencies on greening skills

<table>
<thead>
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<th>Category</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
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<tr>
<td>How learnt skills contribute to greening industries</td>
<td>33.8</td>
<td>55</td>
<td>11.2</td>
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<tr>
<td>Environmental laws and regulations</td>
<td>32.5</td>
<td>52.5</td>
<td>15</td>
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<tr>
<td>Minimisation of environmental impact</td>
<td>36.3</td>
<td>53.8</td>
<td>9.9</td>
</tr>
<tr>
<td>Impact assessment</td>
<td>23.8</td>
<td>63.8</td>
<td>12.5</td>
</tr>
<tr>
<td>Management system of either waste, energy, water</td>
<td>32.5</td>
<td>52.5</td>
<td>15</td>
</tr>
<tr>
<td>What can be recycled</td>
<td>43.8</td>
<td>46.3</td>
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</table>

**Conclusion:**
- 85% strongly agree and agree that the management system of either waste, energy, water developed their technological competency.
- 12.5% and 15% disagree that impact assessment and environmental laws and regulations developed their technological competency.
- 43.8% strongly agree that knowledge on what can be recycled enhanced their technological competency.
Conclusion:

- Majority strongly agree and agree that to conserve fuel, to sort waste, to follow safe working method, to conserve power and to conserve water contribute to students’ behavior development in implementing green skills.

- Only 13.7% and 10% disagree that to sort waste and to follow procedures and instruction and to follow safe working method contribute to their behavior development in green skills.
Report on Greening Skills study (Students)

What do you think are the reasons that stop you from learning environmental skills (greening skills)?

<table>
<thead>
<tr>
<th>Reason</th>
<th>Agree</th>
<th>Disagree</th>
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<tr>
<td>Not in my curriculum</td>
<td>73.1</td>
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<tr>
<td>Teachers never said that it is important for my studies</td>
<td>83.8</td>
<td>16.3</td>
</tr>
<tr>
<td>Teachers are not confident in addressing environmental issues</td>
<td>87.4</td>
<td>12.6</td>
</tr>
<tr>
<td>I am not interested in learning environmental skills</td>
<td>83.6</td>
<td>16.4</td>
</tr>
</tbody>
</table>

Conclusion:
- More than 70% disagree with the statements that environmental skills are not in the curriculum, teachers never say it is important, teachers are not confident and I am not interested in learning environmental skills.
- Less than 30% agree with the statements.
DPE promotes the application of green technologies

Green technology concepts are applied & embedded in the polytechnic system

PolyGreen Blueprint will promote Polytechnics as an active driver of green technology in the region
Thank You
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Greening Skills: How TVET Institutions are responding in Asia and the Pacific region

UNESCO-UNEVOC research study

Dr Margarita Pavlova

ACET Session: Greening TVET and Skills: Responses from the Asia-Pacific Region
Key points to be addressed

- Nature of the study and rationale
- Systematic approach for greening TVET
- Topping up skills
- Results of interventions
- Barriers for green skills inclusion
- Recommendations
Nature of the study and rationale

- Definitions;
- Potential for greening the region;
- Evidences of skills shortages;
- Scope of the study

ACET Session: Greening TVET and Skills: Responses from the Asia-Pacific Region
Definitions

**Greening of skills** – refer to the process of moving from traditional processes, services or organizational arrangements to production processes, services or organizational arrangements that have a reduced environmental impact.

**Topping up skills** for greening means:
- (a) adding skills to meet the skills required at a certain level of competence to perform tasks for "existing occupations" with environmentally friendly practices at work; the addition of these skills DOES NOT LEAD to a different occupation;
- (b) adding skills to meet the skills required at a certain level of competence to perform tasks; the addition of these skills LEADS TO A NEW OCCUPATION.

**Green jobs** are related to work in different sectors “*that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high efficiency strategies; and ... altogether avoid generation of all forms of waste and pollution*” (UNEP/ILO/IOE/ITUC, 2008, p.3)
Green jobs index for Asia

Index scores range from 0 to 4; a higher score means more favorable conditions for green jobs
Source: Asia Business Council (2009).
Global Sustainable Competitiveness Index, 2014 – Asia and the Pacific

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<th>COUNTRIES</th>
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<tr>
<td>New Zealand</td>
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<td>(5.99)</td>
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<td>Australia</td>
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<td>(5.67)</td>
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<td>(5.22)</td>
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<td>(4.51)</td>
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<td>(4.28)</td>
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<td>Turkey</td>
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<tr>
<td>Philippines</td>
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<td>(4.25)</td>
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<tr>
<td>Viet Nam</td>
<td>65</td>
<td>(3.89)</td>
</tr>
<tr>
<td>India</td>
<td>68</td>
<td>(3.85)</td>
</tr>
<tr>
<td>Cambodia</td>
<td>75</td>
<td>(3.71)</td>
</tr>
<tr>
<td>Nepal</td>
<td>77</td>
<td>(3.70)</td>
</tr>
<tr>
<td>Iran, Islamic Republic of</td>
<td>78</td>
<td>(3.68)</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>92</td>
<td>(3.5)</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>95</td>
<td>(3.47)</td>
</tr>
<tr>
<td>Mongolia</td>
<td>96</td>
<td>(3.45)</td>
</tr>
<tr>
<td>Pakistan</td>
<td>105</td>
<td>(3.08)</td>
</tr>
<tr>
<td>Timor-Leste</td>
<td>109</td>
<td>(2.78)</td>
</tr>
</tbody>
</table>

Skills shortages: labor shortages and skill gaps

Difficulties in filling positions due to lack of available talent

<table>
<thead>
<tr>
<th>Countries</th>
<th>Percentage of employers who experience difficulties</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>67%</td>
</tr>
<tr>
<td>China</td>
<td>24%</td>
</tr>
<tr>
<td>Japan</td>
<td>80%</td>
</tr>
<tr>
<td>Australia</td>
<td>54%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>44%</td>
</tr>
<tr>
<td>Singapore</td>
<td>44%</td>
</tr>
</tbody>
</table>

Source: Aring, 2012

Barriers to invest in green buildings in China, 2012 versus 2011

<table>
<thead>
<tr>
<th>Lack of technical expertise</th>
<th>Lack of funding</th>
<th>Uncertainty regarding savings/ performance</th>
<th>Insufficient payback/ROI</th>
<th>Landlord/tenant split incentives</th>
<th>No organizational ownership/ dedicated attention</th>
<th>Lack of awareness about opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>16%</td>
<td>8%</td>
<td>16%</td>
<td>16%</td>
<td>8%</td>
<td>12%</td>
<td>11%</td>
</tr>
<tr>
<td>23%</td>
<td>17%</td>
<td>23%</td>
<td>17%</td>
<td>17%</td>
<td>17%</td>
<td>17%</td>
</tr>
</tbody>
</table>

Source: EU SME Centre, 2013

Estimation of green job numbers in two sectors

<table>
<thead>
<tr>
<th>Country</th>
<th>Green jobs or environment-friendly job estimates (% of total employment) and N of places</th>
<th>Total No. of Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Construction</td>
<td>Agriculture</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1.11 to 4.74% (10,906 – 46,155)</td>
<td>8% (111,253)</td>
</tr>
<tr>
<td>Philippines</td>
<td>11% (211,090)</td>
<td>1.2% (118,000)</td>
</tr>
<tr>
<td>Mongolia</td>
<td>5.2% (3,610)</td>
<td>11.5% (46,435)</td>
</tr>
</tbody>
</table>

Sources: Complied by the author, based on ILO (2014)
Scope

Global GHG emission by sector

- Countries involved
- Limitations (size of the sample over 4 countries 185 students and 35 teachers, particular institutions selected)
- Mongolia as a separate case (sample size 400 students and 100 teachers)
- Medium skill focus and formal training

Source: IPCC, 2007
Systematic approach for greening TVET

- Governments’ role;
- Collaboration of TVET institutions and external partners;
- Mapping against the value chain of occupations; economic development plans; structure of the LM (low, middle, high skills)
Role of the government - inclusion of green skills in curriculum

- Government initiatives in establishing green targets for the economy:
  - Agriculture
  - Green economic transitions: Construction
  - Agriculture

- Government initiatives in the area of developing new training programs:
  - Agriculture

- Government initiatives in greening training standards: Construction
  - Agriculture

- Environmental Legislation: Construction
  - Agriculture

- International Training Standards: Construction
  - Agriculture

- Sectors/occupation regulations and changes: Construction
  - Agriculture

- To provide added or new skills: Construction
  - Agriculture

- Initiatives by my institution: Construction
  - Agriculture

- Emergency of new occupations: Construction
  - Agriculture

11
Inclusion of green skills in curriculum: country specific challenges

Main reasons for greening skills in TVET programs

- Initiatives by my institution
- Green Economic Transition
- Government initiatives in establishing green targets for the economy
- Government initiatives in greening training standards
- Government initiatives in the area of developing new training programs and courses
- International Training Standards
- Sectors/occupations regulations and changes
- Emergence of new occupations
- To provide added or new skills
Role of the partnership: External collaboration

- Industry associations: 43%
- Professional associations: 32%
- Private enterprises: 20%
- Construction
  - We do not cooperate: 3%
  - Others: 2%
- Agriculture

[Chart showing percentages]
The value chain of occupations: Green jobs in construction (core occupations in green building)

- **Conceiving, planning, designing, and advising** (Construction company/Managers and Business Functions; Architects and civil/structural/Environmental Engineers; Architectural Technicians/ Technical Drawing Specialists; HVAC, Electrical, Mechanical, Sanitary, RE & Building Services Engineers/ Designers; Surveyors; Energy and Water Efficiency and Waste management Analysts, Consultants and Advisors)
- **Construction, Installation and maintenance** (Building Site Supervisors, Site Engineers and Site Architects; Conservation; Building Level Renewable Energy (and High Efficiency Energy) Systems)
- **Controlling** (Energy Auditors; Inspectors, Certifiers and Quality Controllers)
- **Enabling** (Policy Makers; Urban Planners; Financing; Educators and Information Providers; researchers)
- **Manufacturing and distribution** (Manufacturers and Distributors of Green Building Materials and Products; IT & System Technicians)
- **Green Building clients** (Developers; Energy Managers, Facilities Managers and Building Managers; Public Servants Working in Procurement and Management of Buildings; Householders and Tenants (ILO, 2011).
Green jobs in agriculture

- **Livestock breeding** (Sustainability concepts in livestock breeding; Heat recovery from animal sheds; Aquaculture);
- **Plant production** (Regionally produced animal feed; Grassland management and protection of marshland; Green cities, towns and villages; Forestry management);
- **Land use** (Nature conservation activities);
- **Service and consultancy activities** (Agricultural consultancy; Milk controls; Insemination; Rural services (agricultural contractors); Irrigation and soil protection);
- **Related sectors** (Agritourism; Direct marketing; Self-marketing; Regional production);
- **Energy and water management** (*Energy management* (creation of jobs, additional sources of income: hydroelectric power; wind energy; solar energy); *Rural energy plans* (local energy plans designed to strengthen self-supply of energy could be tied in with agricultural services); *Water conservation* (water conservation areas; water use plans; recycling of wastewater) (EFFAT, 2013).
Topping up skills

• Diversity of processes that influence greening of skills requirements;
• Diversity of ways greening of skills occur;
• Types of topping up skills and competencies
Motivations for greening TVET programs – Construction (teachers’ perception)

Emergency of new occupations

Elimination of existing jobs

Alteration of occupational processes/methods

Potential elimination of existing jobs

Potential alteration of occupational processes/methods

Philippines
Sri Lanka
Malaysia

Strongly Agree  Agree  Undecided  Disagree  Strongly Disagree

Strongly Agree  Agree  Undecided  Disagree  Strongly Disagree
Motivations for greening TVET programs – Agriculture (teachers’ perception)

- Elimination of existing jobs
- Alteration of occupational processes/methods
- Emergence of new occupations

Alteration of occupational processes/methods

- Philippines
- Malaysia

Graphs showing the distribution of responses on the degree of agreement or disagreement with each motivation.
The ways green skills are included

Construction

These skills are mainly learnt in ‘general’ subjects
These skills are mainly learnt through health and safety modules
These skills are mainly learnt in ‘specialised’ subjects
These skills are mainly learnt through industry placement during the course
I have been involved in extracurricular activities at school that are dealing with environmental issues
I have been involved in activities for communities that are dealing with environmental issues

Agriculture

Agriculture – general subjects

Agriculture – industry placements

Malaysia

Philippines

0% 20% 40% 60% 80% 100%

Strongly Agree Agree Undecided Disagree Strongly Disagree

0% 20% 40% 60% 80% 100%

Strongly Agree Agree Undecided Disagree Strongly Disagree
Types of topping-up green competencies and skills
### Cognitive competencies
- Environmental awareness and willingness to learn about sustainable development
- Systems and risk analysis skills to assess, interpret, and understand both the need for change and the measures required
- Innovation skills to identify opportunities and create new strategies to respond to green challenges
- How to be a part of the solution
- How to think about things differently
- How to be aware of the habits in what you do and think
- How to deal with complexity
- How everything is connected
- How to judge the truth of the matter

### Technological competencies
- Quantification and monitoring of either waste, energy or water
- Management systems of either waste, energy or water
- Selection and acquisition of goods and services from external sources that are appropriate in terms of quality and environmental impact
- Material use and impact quantification
- Impact assessment
- Minimization of environmental impact
- Minimization of materials used
- What can be recycled
- Environmental laws and regulations
- Environmental risk management
- How learnt skills contribute to greening of industry

### Interpersonal competencies
- Strategic and leadership skills to enable change
- Coordination, management and business skills to develop approaches that encompass economic, social and ecological objectives
- Communication and negotiation skills Marketing skills to promote greener products and services
- Networking, IT and language skills to enable participation in global markets
- Consulting skills to advise consumers about green solutions and to spread the use of green technologies

### Intrapersonal competencies
- Adaptability and transferable skills to enable workers to learn and apply the new technologies and processes required to green their jobs
- Entrepreneurial skills to seize the opportunities of low-carbon technologies

Based on Pavlova (in press) *Green skills as the agenda for the competence movement in TVET.*
Green competencies - cognitive

Construction

Environmental awareness and willingness: T  S
Systems and risk analysis skills:  T  S
Innovation skills to respond to green challenges: T  S
How to be a part of the solution: T  S
How to think about things differently: T  S
How to be aware of the habits in what you do and think: T  S
How to deal with complexity: T  S
How everything is connected: T  S
How to judge the truth of a matter: T  S

Strongly agree  Agree  Undecided  Disagree  Strongly Disagree
Some interpersonal competencies that might be closer related to high skill jobs such as

– coordination, management and business skills that encompass social and ecological objectives
– consulting skills to advise consumers about green solutions and to spread the use of green technologies
– Marketing skills to promote greener products and services

attract undecided and disagree responses in both sectors
Technological skills

Construction

Quantification and monitoring of either waste, energy or management systems of either waste, energy, water: T

Selection and acquisition of goods and services from external

Material use and impact quantification: T

Impact assessment: T

Minimisation of environmental impact: T

Minimisation of materials used

What can be recycled T

Environmental laws and regulations: T

Environmental risk management: T

How learnt skills contribute to greening of industry: T

0% 20% 40% 60% 80% 100%

Strongly Agree Agree Undecided Disagree Strongly Disagree
Results of interventions

- Behavior development and values;
- Perceived impact
Less agreement on behavior development in construction

Teachers

- To conserve water
- To conserve power
- To conserve fuel
- To sort waste
- To follow safe working methods
- To follow procedures and
- To meet the requirements of the

Students

- To conserve water
- To conserve power
- To conserve fuel
- To sort waste
- To follow safe working methods
- To suggest better ways to do
- To follow procedures and
- To meet the requirements of the

Strongly agree | Agree | Undecided | Disagree | Strongly Disagree
Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree
Students’ values

**Construction**

- Protecting the environment
- Working in a workplace that protects the environment
- Handing over a world in good shape for the next generation
- Working in a workplace that contributes to handing over a world in good shape for the next generation

**Agriculture**

- Protecting the environment
- Working in a workplace that protects the environment
- Handing over a world in good shape for the next generation
- Working in a workplace that contributes to handing over a world in good shape for the next generation
Perceived impact of program interventions (students)

**Construction**
- Increase my opportunity to find a job
- Help me to contribute to more environmental friendly practices at work
- Help me to contribute to greening of my community
- Help me in life

**Agriculture**
- Increase my opportunity to find a job
- Help me to contribute to more environmental friendly practices at work
- Help me to contribute to greening of my community
- Help me in life

Legend:
- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree
Perceived impact - teachers

Increasing the ability to work in other trades/sectors - construction teachers

- Student employability
- Promoting self-employment
- Advancing skills for protecting environment
- Supporting low-carbon transitions
- Preparing students for lifelong learning
- Increasing the ability to work in other trades/sectors
- Providing new income/occupations for the rural workforce
- Building labour market relevance to our programmes

Malaysia
Sri Lanka
Philippine
China

China
Philippine
Sri Lanka
Malaysia
Barriers for green skills inclusion

- **Both**: lack of an assessment mechanism and certification; no demand for green skills;
- **Agriculture**: need for teaching resources
- **Construction**: non-inclusion of green skills in curriculum; need for professional development; no initiative from administration; to time for teaching green skills

ACET Session: Greening TVET and Skills: Responses from the Asia-Pacific Region
Barriers for teaching environmental skills - agriculture

There are no means to certify environmental skills in existing qualifications standards.

Assessment mechanisms are not in place.

There are less (or none at all) demand for such skills.

It is not in my curriculum.

I do not believe it is important for my students.

I do not have the skills.

I have not been able to access professional development.

I do not have teaching resources.

I am not confident.

The development of ‘green attitude’ among staff is not part of our administration’s initiative.

I do not have the teaching time.

Strongly agree (1)

Agree

Undecided

Disagree

Strongly Disagree (5)
Issues related to curriculum – Agriculture

It is not in my curriculum

- Malaysia: Majority disagree, some undecided, few agree.
- Philippines: Majority disagree, some undecided, few agree.

The development of ‘green attitude’ among staff is not part of our administration's initiative

- Malaysia: Majority disagree, some undecided, few agree.
- Philippines: Majority disagree, some undecided, few agree.

I do not have teaching resources

- Malaysia: Majority disagree, some undecided, few agree.
- Philippines: Majority disagree, some undecided, few agree.

There are no means to certify environmental skills in existing qualifications standards

- Malaysia: Majority disagree, some undecided, few agree.
- Philippines: Majority disagree, some undecided, few agree.

Assessment mechanisms are not in place

- Malaysia: Majority disagree, some undecided, few agree.
- Philippines: Majority disagree, some undecided, few agree.
Issues related to Professional Development - Agriculture

I have not been able to access professional development

<table>
<thead>
<tr>
<th></th>
<th>Philippines</th>
<th>Malaysia</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td>60%</td>
<td>80%</td>
<td>100%</td>
</tr>
</tbody>
</table>

I do not have the skills

<table>
<thead>
<tr>
<th></th>
<th>Philippines</th>
<th>Malaysia</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td>60%</td>
<td>80%</td>
<td>100%</td>
</tr>
</tbody>
</table>

I am not confident

<table>
<thead>
<tr>
<th></th>
<th>Philippines</th>
<th>Malaysia</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td>60%</td>
<td>80%</td>
<td>100%</td>
</tr>
</tbody>
</table>

- Strongly Agree
- Agree
- Undecided
- Disagree
- Strongly Disagree
Barriers for teaching environmental skills - construction

BARRIERS TO TEACHING ENVIRONMENTAL SKILLS (greening of skills) - Combined construction responses from teachers in 4 countries (China, Philippines, Sri Lanka & Malaysia)

1. There are no means to certify environmental skills in existing qualifications standards
   - Strongly agree: 10%
   - Agree: 32%
   - Undecided: 17%
   - Disagree: 22%
   - Strongly disagree: 13%

2. It is not in my curriculum
   - Strongly agree: 21%
   - Agree: 27%
   - Undecided: 22%
   - Disagree: 20%
   - Strongly disagree: 10%

3. I have not been able to access professional development
   - Strongly agree: 17%
   - Agree: 14%
   - Undecided: 14%
   - Disagree: 24%
   - Strongly disagree: 19%

4. Assessment mechanisms are not in place
   - Strongly agree: 16%
   - Agree: 19%
   - Undecided: 17%
   - Disagree: 24%
   - Strongly disagree: 14%

5. There are less (or none at all) demand for such skills
   - Strongly agree: 50%
   - Agree: 9%
   - Undecided: 13%
   - Disagree: 25%
   - Strongly disagree: 8%

6. The development of ‘green attitude’ among staff is not part of our administration’s initiative
   - Strongly agree: 50%
   - Agree: 6%
   - Undecided: 6%
   - Disagree: 27%
   - Strongly disagree: 13%

7. I do not believe it is important for my students
   - Strongly agree: 51%
   - Agree: 9%
   - Undecided: 8%
   - Disagree: 13%
   - Strongly disagree: 7%

8. I do not have teaching resources
   - Strongly agree: 42%
   - Agree: 27%
   - Undecided: 23%
   - Disagree: 6%
   - Strongly disagree: 4%

9. I do not have the skills
   - Strongly agree: 17%
   - Agree: 29%
   - Undecided: 17%
   - Disagree: 11%
   - Strongly disagree: 7%

10. I do not have the teaching time
    - Strongly agree: 20%
    - Agree: 14%
    - Undecided: 14%
    - Disagree: 20%
    - Strongly disagree: 11%
Issues related to curriculum – Construction

**It is not in my curriculum**

- China: 35%
- Philippines: 45%
- Sri Lanka: 40%
- Malaysia: 50%

**I do not have teaching resources**

- China: 50%
- Philippines: 55%
- Sri Lanka: 45%
- Malaysia: 50%

**The development of ‘green attitude’ among staff is not part of our administration’s initiative**

- China: 40%
- Philippines: 50%
- Sri Lanka: 45%
- Malaysia: 50%

**There are no means to certify environmental skills in existing qualifications standards**

- China: 70%
- Philippines: 60%
- Sri Lanka: 55%
- Malaysia: 60%

**Assessment mechanisms are not in place**

- China: 30%
- Philippines: 40%
- Sri Lanka: 35%
- Malaysia: 40%
Issues related to Professional Development - Construction

I have not been able to access professional development

- China
- Philippines
- Sri Lanka
- Malaysia

I do not have the skills

- China
- Philippines
- Sri Lanka
- Malaysia

I am not confident

- China
- Philippines
- Sri Lanka
- Malaysia

- Strongly agree
- Agree
- Undecided
- Disagree
- Strongly disagree
Recommendations

The existing occupations to be made greener and green jobs creation to be scaled up will require:

– a great deal of political support and commitment
– regulatory and institutional frameworks,
– financial as well as technical/ intellectual investments in terms of mapping skills needs and occupations against TVET training and retraining provisions versus the demand
– a multi public-private and community sectors partnerships;
– teachers’ professional development
Making Skills Development Work For The Future

Asia-Pacific Conference on Education and Training 2015
(ACET 2015)

Venue: Berjaya Times Square Hotel, Kuala Lumpur
Date: 3-5 August 2015
Green skills development: urgent need for the development of China

LIU Yufeng, Research Professor, CIVTE MOE
Dayue (David) Fan, Acting Director
UNESCO UNEVOC Centre SZPT, China
The Twelfth Five Year Plan for National Economic and Social Development of P.R. China

Guiding ideology:

• Basic National Policy: saving resources and protecting the environment;
• Action: save energy and reduce greenhouse gas emissions intensity, develop circular economy, popularize low-carbon technology, actively respond to global climate change;
• Aims: economic and social development and population be coordinated with resource and environment, sustainable development.

Main objectives by 2020:

• The water consumption of unit industrial added value decrease by 30%
• Non fossil energy accounts for a share of primary energy consumption reach 11.4%
• Energy consumption per unit of GDP decrease by 16%
• The unit GDP carbon dioxide emissions decrease by 17%.
• Etc.
National Sector Planning

- China manufacturing 2025
  - development policy: green development. Adhere to the sustainable development as a key point to build a strong manufacturing power, to strengthen energy conservation and environmental protection technology, implementation of cleaner production. To develop recycling economy, improve the efficiency of resource recycling, build green manufacturing system, and take the road of ecological civilization development.

- National agricultural sustainable development plan (2015-2030):
  - proposed the overall goal of agricultural sustainable development

- Middle and Long Term Development Plan for Renewable Energy

- National Ecological Environment Construction Plan
State Council’s Decision on the acceleration of the Development of Modern VET(2014)

Focus on capability improvement for the modern agriculture, advanced manufacturing, modern service industry, strategic emerging industries and social management, ecological civilization construction and other areas of personnel training.
# Secondary VET Specialty catalogue (Second batch)

<table>
<thead>
<tr>
<th>Major categories</th>
<th>Majors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, forestry, animal husbandry and fishery</td>
<td>Rural environmental monitoring</td>
</tr>
<tr>
<td>Resource and environment</td>
<td>Environmental monitoring technology</td>
</tr>
<tr>
<td></td>
<td>Environmental management</td>
</tr>
<tr>
<td></td>
<td>Environmental management technology</td>
</tr>
<tr>
<td></td>
<td>Ecological environment protection</td>
</tr>
<tr>
<td>Energy and new energy</td>
<td>Operation and maintenance of electrical and mechanical equipment for wind factory</td>
</tr>
</tbody>
</table>
TVET programmes available

• It is the sector, association or government bodies that delivers training programmes in “Controlling” the occupations. Take construction for example, qualifications and certifications from them control the working posts and promotion

• Example in construction: Rating and labeling system of green buildings (2007)
Survey Conclusion

- TVET Teachers are in action personally or in groups.
- Example.
A group of art teachers in SZPT has noticed the textbook titled “Okala Ecological Design” (2004 Edition), which has been edited by a group of ecological art designers. The book has been recommended by USA Association for Industrial Design and more than a hundred art specialties in higher education institutions are applying it for their education of product design, construction interior design, graphic design and so on. In addition, the teachers also find another book titled “Okala Practitioner, Integrating Ecological Design” (2013 Edition). They are translating them into Chinese and develop concerned Chinese teaching materials for their curriculum improvement.
Survey Conclusion

- The most difficult things for greening is to carry out practical and efficient work according to a systematic planning for achieving the aims bit by bit steadily, change people’s awareness of greening, involve massive people to offer their own contributions for greening development.

- We still have a long way to go and more efforts should be offered jointly nationally and internationally.
谢谢！
Thank You!
Making Skills Development Work For The Future

Asia-Pacific Conference on Education and Training 2015
(ACET 2015)

Venue: Berjaya Times Square Hotel, Kuala Lumpur
Date: 3-5 August 2015
Integrating “Top-Up” Skills in TVET Curriculum
An Approach

Sreeni Narayanan
August 3 2015
Kuala Lumpur

ACET Session: Greening TVET and Skills: Responses from the Asia-Pacific Region
Context & Discussion Points

• Intended to spell out an “How To” model rather than a “What To” model

• This a pilot and with interest, there is a plan to expand this to other vocations.

• There is increased interest & actions being taken( Samples)

• Ambiguity over terminology: Green Skills Vs Greening Skills

• Challenges
Why Greening the TVET

Change in Skills, Occupation and Related Training Needs

Why Greening the TVET?

Skill Needs for the Low-carbon Economy

How: Integrating Green “top up” skills into current TVET System

| Macro-/Systematic Level | ➢ Adapting New top skills into the current TVET agenda  
|                        | ➢ Additional qualifications on advanced training level  
|                        | ➢ Specialization in selected environmental technology occupations |
| Meso-/Institutional Level | ➢ Coordination between industry and TVET institutions  
|                         | ➢ Training of teachers and instructors  
|                        | ➢ Sustainable equipment in training institutions |
| Micro-/Program Level    | ➢ Teaching and learning media / didactical materials  
|                        | ➢ Tested corporate implementation concepts  
|                        | ➢ Collection of good practice |
**Figure 3: Broad Approach to Green Skills 'Top-Up'**

**PHASE 1**
- Initial Assessment
  - Gap Analysis
  - Skills Identification

**PHASE 2**
- Development
  - Integration / Embedding Process
  - Curriculum Modelling

**PHASE 3**
- Implementation & Monitoring
  - Implementation (Pilot Testing)
  - Monitoring & Evaluation

- Understanding the current practices to determine the Gap.
- Determine the current trends and types of skills.
- Design the curriculum with the new green topics.
- Develop pedagogical approach of delivering the course.
- Monitor & evaluate the impact of the program.
## Prototype – Program *(Electrical Installation & Maintenance)*

### Current Course Curriculum *(516 hours)*

| Basic Competencies (20 hours) | • Lead Workplace Communication  
|                               | • Lead Small Teams  
|                               | • Problem Solving  
|                               | • Use Mathematical concepts & techniques  
|                               | • Use relevant technologies |

| Common Competencies (32 hours) | • Construction materials, tools and equipment  
|                               | • Compliance with standard procedures specifications  
|                               | • Technical drawings and plans  
|                               | • Mensuration and related computations  
|                               | • Maintain tools & equipment |

| Core Competencies (464 hours) | • Electric and Hydraulic Tools  
|                               | • Bus ducts and underfloor ducts.  
|                               | • Installation of wiring devices, electrical protection system, electrical lighting system & motor control system  
|                               | • Maintenance, troubleshooting and repair works  
|                               | • Commissioning of electrical systems  
|                               | • Perform programming and installation of basic programmable logic controller (PLC) system |

### Proposed Course Curriculum *(+85 hours)*

| Basic Competencies (20 hours) | • Lead Workplace Communication  
|                               | • Lead Small Teams  
|                               | • Problem Solving  
|                               | • Use Mathematical concepts & techniques  
|                               | • Use relevant technologies |

| Common Competencies (32 + 8 hours) | • Construction materials, tools and equipment  
|                                      | • Compliance with standard procedures specifications  
|                                      | • Technical drawings and plans  
|                                      | • Mensuration and related computations  
|                                      | *Maintain tools and equipment*  
|                                      | *Measuring performance using BEE on electrical techniques* |

| Core Competencies (464 + 77 hours) | • Electric and Hydraulic Tools  
|                                      | • Bus ducts and underfloor ducts.  
|                                      | • Installation of wiring devices, electrical protection system, electrical lighting system & motor control system  
|                                      | • Maintenance, troubleshooting and repair works  
|                                      | • Commissioning of electrical systems  
|                                      | • Perform programming and installation of basic programmable logic controller (PLC) system  
|                                      | • Managing Energy Management System  
|                                      | • Implementing Green Codes & Practices  
|                                      | • Overview of Green Building  
|                                      | • Solar panel installation & Maintenance |
Key Challenges

- Change of mindset
- Transition strategy for reskilling / re-training of workers
- Adapting New Curricula
- Common Agreement among stakeholders
- Training of Teachers / Trainers
- Linking sectoral Theory and Practice
- Adapting right Pedagogical Methods
- Time Constraint
- Market & Students acceptance & uptake
- Potential Budget impact