Greening skills: Research and Practices from Asia and the Pacific region

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To cover

- Background
- Industry demands and practices
- Green skills - TVET practices
- The ways to move forward
Background
Greening of skills - Examples of projects


- CIVTE (2014-2015). *Systematic Design of Green Skills Development in TVET, APEC project*, HRD-01-2014A (China, Australia, Canada, HK, Indonesia, Korea, Malaysia, Viet Nam)
Countries involved in our projects
Cumulative total CO2 emission from 1870 (GtC) caused by human activities

Representative Concentration Pathway (RCP) defines a specific emissions trajectory. GtC - Giga tonne Carbon
Greenhouse gas emissions by economic sectors (worldwide)

Sustainable Development Goals

1. No Poverty
2. No Hunger
3. Good Health
4. Quality Education
5. Gender Equality
6. Clean Water and Sanitation
7. Affordable and Clean Energy
8. Decent Work and Economic Growth
9. Industry, Innovation, and Infrastructure
10. Reduced Inequalities
11. Sustainable Cities and Communities
12. Responsible Consumption and Production
13. Climate Action
14. Life Below Water
15. Life on Land
16. Peace and Justice
17. Partnerships for the Goals
Towards a Green Economy: Twin Challenge

- African countries
- Asian countries
- European countries
- Latin American and Caribbean countries
- North American countries
- Oceanian countries

- UNDP threshold for high human development

- World average biocapacity per capita in 1961
- World average biocapacity per capita in 2006

- High human development within the Earth’s limits

United Nations Human Development Index

Ecological footprint (global hectares per capita)
The Linear Economy

Source: ‘Sense and Sustainability - Educating for a low carbon world’, Ken Webster and Craig Johnson. TerraPreta, 2008
A Circular Economy (where waste = food)

‘Nature as Natural Capital’

- ecosystems
  - forests
  - oceans
  - soils etc
- species (biodiversity)

Increasing SURPLUS

Biological nutrients (b) return to biosphere to enhance natural capital

Technical nutrients (t) are metals, plastics and other non-compostable materials which circulate from user (consumer) to manufacturers

after W. McDonough and M. Braungart
Dream Farm - change in thinking

- All energy needs: electricity, heating, lighting, cooking, food processing
- Biogas
- Algal basin
  - Detoxified water
- Fishpond
  - Fish harvests
  - Fertigation
- Worms
  - Compost
  - Savings on fertilizers and pesticides
- Diverse crops
  - Harvests
- Livestock manure & waste water
- Meat and dairy produce
- Mushroom harvests

Flow diagram illustrating the interconnected systems of Dream Farm, highlighting the focus on sustainability and efficiency in agricultural production.
Industry Key points to be addressed

- Green industries - greening industries
- How to identify competencies required for greening of economies?
- Skills/competencies associated with greening
Green industries
Composition of environmental industries

- Sewerage and waste management,
- Environmental engineering and consultancy services;
- Import/export and wholesale trading of waste and scrap.

(HKSAR Census and Statistics department, 2005)

Occupations in environmental industries

- Water conservation and pollution control
- Air and odor pollution control
- Energy conservation
- Waste treatment, disposal and recycling
- Noise control and mitigation
- Environmental consulting services (HKTDC, 2014)

Educational Programs

- Post graduate level (including Postgraduate diploma, Masters by course and by research, PhD) - 380
- Bachelor - 310
- Higher diploma - 280
- Professional diploma and other training for employees
Policies vs. Training provision gaps - The Philippines

- Analysis of government policies and existing TVET provisions identified gaps in the following training areas:
  - **Technicians**: Methane/land field gas generation system; biofuels processing; biomass plan; wind turbine service; hydroelectric plant; geothermal; edible vertical gardens; renewable energy
  - **Workers**: air/water pollution control; Methane/land field gas collection system

**TESDA Green Technology Centre – the Philippines**

Built in partnership with the Federation of Filipino Chinese Chambers of Commerce and Industry Inc. (FFCCCI), the TESDA Green Technology Center (GTC) will serve as the green skills hub, which will offer training courses to cater to the needs for renewable and emerging green jobs.
Skill gaps - Viet Nam

- Governments’ plans to set up 10 high-tech agricultural zones and areas in the country by 2020, and another 10 by 2030 set up a very high demand for updating/ topping up skills in agriculture.
- Use of advanced technologies such as solar energy for drying fruits or rice require additional skills. Seminars organized by donors/investors to support local farmers in topping up their skills through learning about new practices can provide the required in-service training.
- However, TVET should respond quickly by adjusting their training programs to support the demand initiated by the government initiative to minimize the skills gaps.
Construction industry

Case study
Construction sector in Asia

Construction spending by country 2013 (US$)

Construction spending growth 2014-19 (% per annum)

Construction spending in Asia accounted for 44 percent of total global construction spending in 2013 (AECOM, 2014)

Green Building Activities in South East Asia - 2008 - 2014

A Survey by BCI (2014)
Green building sector in China

- Introduction of the Chinese Green Building Standard
- Annual growth rate of 60% in the green building sector (EU SME Centre, 2013)
  - Creates energy-saving opportunities at the market
  - Demand for skill training in construction increase

Source: (IGEBC, 2014)
Barriers to invest in green buildings in China, 2012 versus 2011

- Lack of technical expertise: 16% (2011) vs. 23% (2012)
- Uncertainty regarding savings/performance: 16% (2011) vs. 16% (2012)
- Insufficient payback/ROI: 14% (2011) vs. 17% (2012)
- Lack of funding: 14% (2011) vs. 17% (2012)
- Landlord/tenant split incentives: 12% (2011) vs. 13% (2012)
- No organizational ownership/dedicated attention: 8% (2011) vs. 11% (2012)
- Lack of awareness about opportunities: 8% (2011) vs. 13% (2012)

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>
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<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>
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<tr>
<td>Singapore</td>
<td>44%</td>
</tr>
</tbody>
</table>

Source: EU SME Centre, 2013

Source: Aring, 2012
## Skills Gap: construction

<table>
<thead>
<tr>
<th>Unfulfilling demand of occupations in the following areas:</th>
<th>Occupations considered to be the most in-demand in the next five years:</th>
<th>Important soft skills required for tradesmen</th>
</tr>
</thead>
<tbody>
<tr>
<td>• green building expertise</td>
<td>• Engineers,</td>
<td>• strategic skills,</td>
</tr>
<tr>
<td>• professionals handling engineering works with green building expertise</td>
<td>• BERDE Assessors,</td>
<td>• environmental awareness and sustainable development,</td>
</tr>
<tr>
<td>• quantity surveyors</td>
<td>• Green Building Certifiers,</td>
<td>• coordination,</td>
</tr>
<tr>
<td>• safety engineers</td>
<td>• Green Material Suppliers,</td>
<td>• management and business skills, and</td>
</tr>
<tr>
<td>• energy designers and managers</td>
<td>• Maintenance/Project Managers,</td>
<td>• innovation</td>
</tr>
<tr>
<td>• sustainability officers, waste management officers</td>
<td>• Electrical/Energy Managers,</td>
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<tr>
<td>• marketing personnel with significant knowledge in green building</td>
<td>• Sanitation Personnel, and</td>
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<td></td>
<td>• Mechanical/Laborer with Green Building Know-how</td>
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(Mondal, Iqbal and Mehedi, 2010)
What shall we consider in identifying skills for greening?
Environmental issues associated with the construction industry

- Reduce emissions of GHG gases, move towards waste reduction, recycling and recovery, consumer information, and encouraging movement in the market
- Energy-efficiency of residential buildings
- Raw material extraction and consumption, land use change
- Eco-innovations, “smart” building materials
- Reuse of materials in the construction industry
- Cultural, social and environmental ramifications
- Constructing buildings that are durable and long lasting, making the future environment safe, and making the materials from sustainable resources
- Enhancing and better protecting the natural environment; and minimising its impact on the consumption of energy (especially carbon-based energy) and natural resources
Achieving green building credentials

Products and processes

- Responsible sourcing of bio-based and renewable (raw) materials
- Whole building energy simulation
- Energy efficient/intelligent lighting
- Intelligent HVAC monitoring systems
- Energy management Systems (EMS)
- Sustainable roofing solutions
- Reflective roofing materials, green roofs
- Insulation products for roofs, ceilings, walls and pipes
- Renewable Energy Systems
- Energy efficient/Intelligent lighting
- Water efficient fixtures and fittings
- Rainwater and stormwater management/retention
- Sustainable wastewater management
- Water sub-metering and leak detection systems
- Use of recycled or renewable materials
Available technologies that were used in SE Asian construction industries

An indication to the types of technology that should be included in TVET programs

<table>
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<th>Frequently used</th>
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<td>• Energy efficient/intelligent lighting</td>
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<td>• Water efficient fixtures and fittings</td>
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<td>• Insulation products</td>
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<tr>
<td>• Rainwater and storm water management/retention</td>
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<table>
<thead>
<tr>
<th>50% used</th>
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</thead>
<tbody>
<tr>
<td>• Energy efficient appliances</td>
</tr>
<tr>
<td>• Use of recycled or renewable materials</td>
</tr>
<tr>
<td>• Sustainable roofing solutions (including reflective and green roofs)</td>
</tr>
<tr>
<td>• Renewable energy systems (BCI, 2014).</td>
</tr>
</tbody>
</table>
Green jobs in construction (green buildings)

Six clusters of green occupations classified by ILO (2011)

► 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).
How? Multifaceted approach

- Specialized green skills
  - Environmental issues associated with construction industry;
  - Most frequently used technologies;
  - Green building credentials

- Training provisions - now and future orientation:
  - Value chain clusters of occupations;
  - Governments’ targets;
  - Employer surveys - most in demand occupations; greening activities; soft skills; missing competencies
  - Skills at all levels - low, middle and high

- Topping up skills
  - Cognitive; technological; interpersonal and intrapersonal
Skills for Green industries

- Support and improve existing mechanisms for developing occupational and training standards;
- Establish effective mechanisms for on-going updating of existing training programs;
- Support Labor Market scans;
- Ensure availability of training programs (including new facilities and equipment to deliver new programs);
- Support a Coordinating body that overlooks green development and skills requirements
Greening of industries
Green awardees (HK)

- Greening operations through
  - management strategies and
  - inclusion of new green technical innovations

- Produce green products (e.g. gas stoves, solar panels)
Skills associated with greening by companies at the level of Company Managers/ Environmental Committees/ Individual Environmental engineers (Leadership):

- **Technical skills** to develop in-house innovation
- **Managerial skills in relation to greening**
  - General approaches, e.g. understanding of how carbon footprint can be calculated; of how to develop action plan for greening; auditing and evaluation
  - Understanding of National envir. legislation and International policy guidelines (ISOs)
  - Understanding of local support schemes, e.g. Cleaner production program
  - Ability to identify green technologies available on the market, evaluate and apply to their company;
  - Communication skills, e.g., collaborate with universities on research
  - Capacity to pinpoint appropriate green procurement
Skills associated with greening by companies for all employees

- Green mindset for all employees - for all types of companies
Competencies for dealing with tasks and challenges

Competences for dealing with tasks and challenges in Towngas (At present)

- be committed
- govern oneself
- build trust
- have social astuteness
- have interpersonal influence
- be a social person
- be inventive
- control and coordinate
- cope with chaos and uncertainties
- externalise
- interpret
- negotiate
- combine

Competences for dealing with tasks and challenges in Golden Cup Printing (at present)

- be committed
- govern oneself
- build trust
- have social astuteness
- have interpersonal influence
- be a social person
- be inventive
- control and coordinate
- cope with chaos and uncertainties
- externalise
- interpret
- negotiate
- combine

Innovativeness, including green innovation - for ‘open innovation companies’
Skills/Competencies required

- Combination of green mindsets, technical skills and specific managerial skills are required to support green innovation. Leadership is a key.
- The intensity of these skills depend on the level of appointment and the type of organization.
- Generic competencies for all companies depend on the occupational level.
- *Inventiveness* and *social skills* are important for all levels at ‘open innovation’ companies.
- TVET can help by developing the above competencies.
Greening Skills - TVET

Key points to be addressed

- Drivers behind TVET institutions’ greening
- How green competencies being addressed
- Classification of green skills
- Results of interventions
- Barriers
Drivers behind TVET institutions’ greening
TVET institutions: Reasons for greening

- Government initiatives
- International training standards used by vocational training providers (VTPs)
- Environmental legislation
- Rules and regulations in industry
- New occupations
- TVET providers’ initiatives
Role of the government - inclusion of green skills in curriculum

Government initiatives in establishing...
Green economic transitions: Construction
Government initiatives in the area of...
Government initiatives in greening...
Environmental Legislation: Construction
International Training Standards:...
Sectors/ occupation regulations and...
To provide added or new skills:...
Initiatives by my institution: Construction
Emergency of new occupations:...

[Bar chart showing responses: Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree]
Mongolia: Main reasons for greening TVET programs

- Green Economic Transitions
- To provide added or new skills
- Initiatives by my institution
- Emergence of new occupations
- Sectors/occupations regulations and changes
- Government initiatives in the area of...
- Government initiatives in greening training...
- Government initiatives in establishing green...
- Environmental legislation
- International training standards

![Bar Chart showing the main reasons for greening TVET programs in Mongolia](chart.png)
TVET colleges initiatives
SunPulse Water
Solar Water Pump

The SunPulse Water is a world-leading low-temperature Stirling engine water pump for decentralized water supply and distribution. It is particularly simple to construct and can therefore be produced locally.

Concept
The SunPulse Water can pump water from various depths according to the water pump which has been installed with the engine. The effectiveness of the engine can be increased with additional water tank. The machine is working when the sun is shining and the distribution of the water for irrigation or to the houses can be done out of the tank even when there is no sunlight. This machine uses the sunlight to heat the air inside the engine and the pumped water to cool it again, resulting to pressure fluctuations inside the engine, which are moving a piston. The piston will turn the flywheel, then rotation of flywheel can be used for various applications, for example to drive water pump like in this Sunpulse Water.

1. Driving air compressor to store compressed air to be used for pneumatic tools, for water degeneration, etc.
2. Driving a generator to produce electricity
3. Driving an oxygen concentrator to selectively filter oxygen from atmosphere air.

Technical details
- Dimension : 3600 x 3600 x 3400 mm (with booster)
  2500 x 2500 x 1800 mm (without booster)
- Total weight : 650 kg
- Manual daily tracking angle movable
- Water cooler temperature : max 32 E
- Out rotation of machine : 360 rpm
- Depth of wells : maximum 3 meters (7 meters with special pump)
- Pumping height : maximum 10 meters (30 meters with special pump)

Advantages
- Use sun’s rays as energy, so it is environmentally friendly and cost efficient solution.
- Can also be employed to provide drinking water
- SunPulse water with bellow pump can grab from storage lakes or ground water from max 3 meters deep, and max 10 meters high, this is covering the irrigation of an average family business.
- Can pump deeper till 60 m with by coupling with an immersed piston pump like India Mark 2.

Application
- Suitable for developing countries that the majority of the population depends on home grown agricultural products.
- Can be produced with the simple facilities available in sunbelt countries.
- Can be put into service as the prime mover in a variety of other applications, such as:
  1. Driving grain mills, power saws, presses etc.
Polytechnics’ respond to government initiatives: topping-up approach - Malaysia

- To support Green Technology policy by the government, Polytechnic Port Dickson, Negeri Sembilan, Malaysia set up a research team to identify a program that can be delivered by the institution, including knowledge and skills requirements and the ways they can be presented in curriculum.

- After conducting a secondary and primary research, a Diploma in Electrical Engineering (Energy efficiency) was established. The new program was based on the existing Diploma in Electrical Engineering (Power) with some modifications that include introduction of the new courses: Energy efficiency and Conservation; Energy Measurement and Instrumentation; Renewable Energy; Fundamentals of Electric Utilities; and Energy Management and Audit.
Greening of VTPs - a holistic approach

<table>
<thead>
<tr>
<th>Attitude change</th>
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<tbody>
<tr>
<td>Teaching and learning</td>
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<tr>
<td>‘Green’ content</td>
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<tr>
<td>‘Green’ content</td>
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<tr>
<td>Generic skills</td>
</tr>
<tr>
<td>Learner-oriented</td>
</tr>
<tr>
<td>including workplace learning + links with community</td>
</tr>
</tbody>
</table>
Role of the partnership: External collaboration

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

Agriculture
- Industry associations: 17%
- Private enterprises: 83%
How green competencies being addressed?
The ways green skills are included

These skills are mainly learnt in “general” subjects

These skills are mainly learnt through health and safety modules
These skills are mainly learnt in “specialized” subjects

These skills are mainly learnt through industrial placement

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
The ways green skills are included - contexts

Agriculture - general subjects

Agriculture - industry placements
Nature of topping-up skills
Identification of green skills composition
<table>
<thead>
<tr>
<th>Cognitive competencies</th>
<th>Environmental awareness and willingness to learn about sustainable development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Systems and risk analysis skills to assess, interpret, and understand both the need for change and the measures required</td>
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<td></td>
<td>Innovation skills to identify opportunities and create new strategies to respond to green challenges</td>
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<tr>
<td>How to be a part of the solution</td>
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<tr>
<td>How to think about things differently</td>
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<tr>
<td>How to judge the truth of the matter</td>
<td></td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Interpersonal competencies</th>
<th>Strategic and leadership skills to enable change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Communication and negotiation skills Networking, IT</td>
</tr>
<tr>
<td></td>
<td>and language skills to enable participation in global markets;</td>
</tr>
<tr>
<td></td>
<td>Marketing skills to promote greener products and services; Consulting skills to advise consumers about green solutions and green technologies;</td>
</tr>
<tr>
<td></td>
<td>Coordination, management and business skills to develop approaches that encompass economic, social and ecological objectives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intrapersonal competencies</th>
<th>Adaptability and transferable skills to enable workers to learn and apply the new technologies and processes required to green their jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Entrepreneurial skills to seize the opportunities of low-carbon technologies</td>
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<tr>
<td></td>
<td>Based on Pavlova (2016) <em>Green skills as the agenda for the competence-movement in TVET.</em></td>
</tr>
</tbody>
</table>
### TVET responses to greening in sector: Green competencies - cognitive

#### Construction

<table>
<thead>
<tr>
<th>Competency</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental awareness and willingness:</td>
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<td>S</td>
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</table>
### Mongolia: Cognitive competencies

<table>
<thead>
<tr>
<th>Competency</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental awareness and willingness to learn about...</td>
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<td>Systems and risk analysis skills to assess, interpret, and...</td>
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</table>
Results of interventions

• Behavior development and values;
• Perceived impact
Behavior developed in the classroom (construction, less agreement)
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)

Mongolia
Perceived impact - teachers

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

- **Malaysia**
- **Sri Lanka**
- **Philippine**
- **China**
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; too much time for teaching green skills
Barriers for teaching environmental skills - agriculture

BARRIERS TO TEACHING ENVIRONMENTAL SKILLS (greening of skills): Combined agricultural responses from Philippines and Malaysia

- There are no means to certify environmental skills in existing qualifications standards (25%)
  - 17% Strongly agree
  - 25% Agree
  - 58% Undecided
  - 0% Disagree
  - 0% Strongly Disagree

- Assessment mechanisms are not in place (17%)
  - 17% Strongly agree
  - 17% Agree
  - 50% Undecided
  - 17% Disagree
  - 0% Strongly Disagree

- It is not in my curriculum (50%)
  - 0% Strongly agree
  - 25% Agree
  - 17% Undecided
  - 25% Disagree
  - 0% Strongly Disagree

- I have not been able to access professional development (25%)
  - 0% Strongly agree
  - 25% Agree
  - 0% Undecided
  - 25% Disagree
  - 50% Strongly Disagree

- I do not believe it is important for my students (42%)
  - 0% Strongly agree
  - 0% Agree
  - 42% Undecided
  - 0% Disagree
  - 58% Strongly Disagree

- I do not have teaching resources (25%)
  - 0% Strongly agree
  - 0% Agree
  - 25% Undecided
  - 25% Disagree
  - 50% Strongly Disagree

- The development of ‘green attitude’ among staff is not part of our administration’s initiative (42%)
  - 0% Strongly agree
  - 0% Agree
  - 42% Undecided
  - 17% Disagree
  - 0% Strongly Disagree

- I do not have the teaching time (10%)
  - 0% Strongly agree
  - 17% Agree
  - 25% Undecided
  - 25% Disagree
  - 42% Strongly Disagree

- I do not have the skills (42%)
  - 0% Strongly agree
  - 0% Agree
  - 42% Undecided
  - 0% Disagree
  - 58% Strongly Disagree

- I am not confident (17%)
  - 0% Strongly agree
  - 0% Agree
  - 17% Undecided
  - 0% Disagree
  - 83% Strongly Disagree

Legend:
- Blue: Strongly agree
- Red: Agree
- Green: Undecided
- Purple: Disagree
- Orange: Strongly Disagree

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Recommendations - how to move forward
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
<table>
<thead>
<tr>
<th>Awareness</th>
<th>Curriculum</th>
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<tbody>
<tr>
<td>• Of environmental impact of industrial and household practices – all population</td>
<td>• Flexibility of curriculum frameworks (around 30 percent)</td>
</tr>
<tr>
<td>• Capacity building at all levels of TVET: government officials, principals and managers, teaching staff, students</td>
<td>• Existing status and power of TVET principals</td>
</tr>
<tr>
<td>• Capacity building for industry (so companies can think in terms of skills requirements and can predict skills requirements as well as convey this to TVET)</td>
<td>• Focus on both generic and specific green skills</td>
</tr>
<tr>
<td>• Generic green skills can be included in existing modules and courses or as new environmental awareness modules (can be included in anticipation of industry demands)</td>
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<tr>
<td>• Differentiate generic green skills for low, medium and high skill levels</td>
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<tr>
<td>• Greening of training standards</td>
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Government support: TVET policies

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<td>• A need to connect ongoing TVET reform and existing schemes with the greening of skills supply (including through national skills standards development and updates)</td>
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<td>• To ensure that government policies and initiatives in skills development include greening and greening of education for TVET teacher</td>
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<tr>
<td>• A targeted effort across different ministries and different levels of education and skills training</td>
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<td>• Incentives to support good practice in TVET</td>
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Greening of industries (to formulate demand and establish green industry placements)

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<td>• Development of green industries (e.g. renewable energy; waste management and green transport)</td>
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<tr>
<td>• Development of green practices in all industries (e.g. hospitality, construction and manufacturing)</td>
</tr>
<tr>
<td>• Green entrepreneurship</td>
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<tr>
<td>• Environmental regulations</td>
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<tr>
<td>• Training for industry at TVET institutions</td>
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<td>• Development of databases and the ways of measuring green skills</td>
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Five dimensions of TVET greening (Pavlova 2015)

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<td>• Support different aspects of programs development</td>
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Involvement of different stakeholders

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Greening of all industries

Transition from traditional production processes and services to those that reduce environmental impact

- Confirm required skills and competencies
- Ensure a holistic approach to develop ‘green’ behavior and ‘green mindset’
- Greening at all skills levels
Main points

To achieve change

- Leadership
- General awareness, attitudes and ‘green mindset’
- Technical competencies for green innovation
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