Teaching and Learning Strategies for
Sustainable Science Programs in Higher Education:
From Japanese Perspectives

Yuto Kitamura, The University of Tokyo

Abstract

Today's universities are under strong influence of globalization in various aspects. A particularly marked manifestation of this trend is the transnational movement of students. At universities we have found students coming from diverse backgrounds, and needs and demands for higher education have changed significantly today. Responding to this situation, changes in teaching and learning styles have been occurring at universities in recent years. Such shifts of teaching and learning styles are happening more obviously in the fields of sustainability sciences.

Also, recent rapid changes in Asian societies have stirred a sense of crisis that questions simple memorization of an existing body of knowledge as inadequate to prepare students for future challenges. This sense of crisis has spread widely throughout Asia including Japan, particularly with strong interests to realize more sustainable societies. As a result, many countries and areas including Japan now have a heightened awareness that it is essential to develop students' "new academic abilities", particularly in the process of promoting sustainability science.

These "new academic abilities," the competences that are expected of 21st-century human resources in the knowledge-based society, encompass abilities in a broad range of areas. They include the ability to effectively communicate with others and find solutions to problems, in addition to the conventional ability to acquire knowledge. They are inter-disciplinary, or even trans-disciplinary, in their nature. Today's societies expect higher education to improve students' wide-ranging generic skills, including creativity, flexibility, autonomy, teamwork, communication skills, and critical thinking. The motivation for this expectation is two-fold: learning is expected to prepare students for entry into the job market (i.e., learning for increasing students' employability) on the one hand and on the other for civic life.
The former is based on the requirements for certain abilities that are expressed mainly by the industrial world. The neo-liberalist influence can be discerned here. On the other hand, the latter comes from the need for generic skills as a foundation on which to build a progressive community following the ongoing trend to place increasingly greater emphasis on active citizenship and community life, as a result of global advances in research concerning learning communities and lifelong learning. While it is up to the respective countries to decide on which of the two types of abilities to attach importance, most countries including Japan are striving to strike a good balance between the two.

This presentation aims at sharing the experiences of Japanese higher education, with a particular focus on the University of Tokyo, how they have been trying to respond to the above-mentioned changes and to contribute to the creation of more sustainable world in the post-2015 era.

*Keywords: Teaching and learning, New academic abilities, Employability, Civic life, Active citizenship*
Teaching and Learning Strategies for Sustainable Science Programs in Higher Education: From Japanese Perspectives

Yuto Kitamura
Associate Professor, Graduate School of Education
Adjunct Associate Professor, Graduate Program in Sustainability Science
Graduate School of Policy Studies
The University of Tokyo

Outline of the Presentation

Introduction
1. Higher Education and Sustainable Development
2. Quality of Teaching and Learning
3. International Cooperation to Promote Sustainability Sciences
Conclusion

Introduction

Higher Education Today

• Globalization accelerating the mobility of people, goods, information and capital
• Increasing mobility of students and their diverse backgrounds
• Widening gaps between people, nations and regions
• A sense of crisis that questions simple memorization of an existing body of knowledge
• Innovation in teaching and learning
• Essential to develop students’ “new academic abilities”

New Academic Abilities

• The competences of 21st-century human resources in the knowledge-based society.
• Ability to effectively communicate with others and find solutions to problems.
• Expecting higher education to improve students’ wide-ranging generic skills, including creativity, flexibility, autonomy, teamwork, communication skills, and critical thinking.
• Learning for increasing students’ employability and learning for civic life.

1. Higher Education and Sustainable Development
What is “sustainability”? 

Development that meets the needs of the present while safeguarding Earth’s life-support system, on which the welfare of current and future generations depends.

Sustainable Development Goals (SDGs)

- SDG4 as the Education Goal: 
  Ensure inclusive and equitable quality education and promote life-long learning opportunities for all

- Learning outcomes → - What does the quality of education mean? 
  - Output/Outcome based approaches

How to Deal with the Human Capital Perspectives

- Traditional emphasis on school attainment
- Development of access to educational opportunities: MDGs→SDGs
- Some success but still challenges
  - Quality as a key element
  - Cognitive and non-cognitive skills: Individual learning

How the demand for skills has changed

<table>
<thead>
<tr>
<th>Routine Task Input</th>
<th>Non-routine Task Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>e.g., assembly line</td>
<td>e.g., identifying and solving new problems</td>
</tr>
<tr>
<td>e.g., filing, bookkeeping</td>
<td>e.g., assembling critical information and conveying a convincing interpretation of it to others</td>
</tr>
</tbody>
</table>

Source: Yoshida (2014)
Unequal Distribution of Knowledge for Development

Youth unemployment

The chart compares data on youth labor market situations, regular and irregular employment, unemployment (relaxed definition) and inactivity in four least-developed countries (LDCs) – Cambodia, Liberia, Malawi and Togo – and four high-income European countries (Belgium, France, the Netherlands, and Portugal).

Skills mismatches point up poorer quality of education and the absence of links between education systems and employers as underlying problems. At the tertiary level in some countries, young people are confronted with a university system that has traditionally been focused on educating for a life in public employment, with little regard for the needs of the private sector.

2. Quality of Teaching and Learning

Four Pillars of Learning

Four Pillars of Learning

Transformation of Teaching and Learning

“Literacies” for Global Agenda

Problems to be tackled in interdisciplinary manners: Economic, Environmental, Societal, Geopolitical, Technological
Fostering “Global Human Resource” and the Introduction of “Active Learning”

“Global Human Resources” who can apply knowledge in the changing world

“Active Learning” for more progressive ways of teaching and learning

Diverse modes of teaching and learning
- Student participation
- Collaborative studies
- Problem-Based Learning/Project-Based Learning, etc.

What do we expect?
- From “passive” learning to “active” learning
- Changing the consciousness of teachers → From “provider” to “supporter”
- Creating “Learning Community”
- Transforming and creating new “knowledge”

Process of Active Learning

Input
- Documents, Data
- Visual materials, etc.

Transform
- Analysis, Assessment/Evaluation

Output
- Synthesis

My Concern…
- Too much emphasis on practical aspects of learning
- Learning outcomes should not be assessed by a satisfactory level of students but what they actually have learned
- Intellectual foundation and a sense of social responsibilities to be critical, creative and innovative
- Of course students need more opportunities, particularly through international experiences

3. International Cooperation to Promote Sustainable Science Programs

Promoting Sustainable Science Programs
- More effective internal coordination inside HEIs is required to develop the ESD-related program which enables students to acquire cross-disciplinary perspectives.
- More opportunities for practical learning, such as experimental learning, fieldwork and internship programs. → How best to position them in the curriculum?
- Teaching methods for ESD and their outcomes should be explored more thoroughly.
- The establishment of authorized systems connecting ESD with employment, industries, and community development should be considered.
Old-fashioned Typology of International Cooperation in Higher Education: Characteristics

<table>
<thead>
<tr>
<th>Knowledge Transfer</th>
<th>Intellectual Exchange</th>
<th>Development Assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mutual</td>
<td>Basically one way</td>
</tr>
<tr>
<td>Funding</td>
<td>- Non ODA:</td>
<td>- Official Development Assistance (ODA):</td>
</tr>
<tr>
<td></td>
<td>Offset provided by HE institutions in developed countries, but sometimes mutually generated with institutions in developing countries.</td>
<td>Officially provided by HE institutions in developed countries, but occasionally mutually generated with institutions in developing countries.</td>
</tr>
<tr>
<td>Relationship of Actors</td>
<td>Equal partnership</td>
<td>Donor-Recipient</td>
</tr>
<tr>
<td>General Period</td>
<td>Mid-term to Long-term</td>
<td>Short-term to Mid-term</td>
</tr>
</tbody>
</table>

Different Stages of International Cooperation in Higher Education

Towards a New Stage...Mutuality!

- Intellectual Development Cooperation:
  - Mix of the old-fashioned types of international cooperation in higher education
  - More mutual efforts to promote sustainable development.

⇒ [ASEAN + EU] To Support to Higher Education in ASEAN Region (SHARE)

[Japan] Science and Technology Research Partnership for Sustainable Development (SATREPS)
Japan Science and Technology Agency (JST)

[USA] Partnership for Enhanced Engagement in Research (PEER)
United States Agency for International Development (USAID)
National Science Foundation (NSF)
National Institutes of Health (NIH)

Prospect of International Development Cooperation

- Resilience is an important element to be shared internationally
- Learning from the experience from East Japan Earthquake, Tsunami and Fukushima Nuclear disaster

- Trans-disciplinary research and education: Natural science, social science and humanities working with stakeholders
- Future Earth considers SDGs as an exemplary case

- SDGs are already happening
  - I.e. Climate adaptation finance
  - How to institutionalize them from global to local levels of governance - governance challenge

Towards a New Stage...

- Intellectual Development Cooperation:
  - Mix of the old-fashioned types of international cooperation in higher education
  - More mutual efforts to promote sustainable development.

⇒ [ASEAN + EU] To Support to Higher Education in ASEAN Region (SHARE)

[Japan] Science and Technology Research Partnership for Sustainable Development (SATREPS)
Japan Science and Technology Agency (JST)

[USA] Partnership for Enhanced Engagement in Research (PEER)
United States Agency for International Development (USAID)
National Science Foundation (NSF)
National Institutes of Health (NIH)

Prospect of International Development Cooperation

- Resilience is an important element to be shared internationally
- Learning from the experience from East Japan Earthquake, Tsunami and Fukushima Nuclear disaster

- Trans-disciplinary research and education: Natural science, social science and humanities working with stakeholders
- Future Earth considers SDGs as an exemplary case

- SDGs are already happening
  - I.e. Climate adaptation finance
  - How to institutionalize them from global to local levels of governance - governance challenge

Remaining Questions to Sustainability Science Programs

- What do we mean by "Global"? And how do we train students to go from "local" to "global"?
- What are its innovative and unique features against other leading programs across the world?
- How is the program’s approach to sustainability education different from those observed in Europe, Africa and other places?
- What is the goal of the program and who defines it?
- Transdisciplinarity vs Interdisciplinarity

Conclusion
Making Our Teaching and Learning More Sustainable
Challenges: Curriculum-related issues

• Foundation competency for sustainability vs. Specialized skills relevance to courses
• Overlapping of course contents
• Balance between field exercises and lectures
• Quality of curriculum, not only standard aspects such as lectures but especially innovative aspects like field work and interdisciplinary research. Any benchmarks?
• Inadequacy of the student-driven element in the formal part of the program?

Challenges: Faculty-related issues

• Single-discipline trained but are supposed to promote multi-/inter-disciplinary approaches
• Faculty composition in relation to the international or global level of sustainability education
• Commitment of faculty to remedial action
• Need for faculty-student collaboration to fill the gaps for program improvement
• More faculties in natural science fields and less in social sciences
• Treatment of value question in sustainability science

Conclusion: Making Our Higher Education More Sustainable

• The promotion of global well-being should be considered as a social responsibility of higher education institutions.
• More active learning and student involvement and more practical experiences both inside and outside classrooms
• Graduates’ employment record
• Universities can facilitate the expansion of networks
• More collaboration across the countries: International Development cooperation

Thank you very much for your attention.

Yuto Kitamura, Ph.D.
Associate Professor
Graduate School of Education
The University of Tokyo
# The 4th GPSS-GLI International Symposium

<table>
<thead>
<tr>
<th>Name:</th>
<th>Yuto Kitamura</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliation:</td>
<td>Associate Professor, Graduate School of Education / Adjunct Associate Professor, Graduate Program in Sustainability Science-Global Leadership Initiative (GPSS-GLI), Graduate School of Frontier Sciences</td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:yuto@p.u-tokyo.ac.jp">yuto@p.u-tokyo.ac.jp</a></td>
</tr>
</tbody>
</table>

## Profile

Yuto Kitamura, PhD, is an Associate Professor in the Graduate School of Education, The University of Tokyo. He received his Ph.D. in education from the University of California, Los Angeles (UCLA). He had worked in the Education Sector of UNESCO in Paris and taught at Nagoya University and Sophia University, both in Japan. He was a Fulbright Scholar at the George Washington University, Visiting Professor at the University of Dhaka in Bangladesh, and is currently Special Advisor to Rector of the Royal University of Phnom Penh in Cambodia. He is also a Member of the Science Council of Japan. He is specialized in comparative education and has been conducting his researches extensively on education policy of developing countries, particularly in Southeast Asia. His recent publication includes: Emerging International Dimensions of East Asian Higher Education (co-editor, Springer, 2014) and The Political Economy of Schooling in Cambodia (co-editor, Palgrave Macmillan, 2015).