Promoting the Global Leader Education at the School of Engineering, UT

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Abstract
As one of leading universities in the world, the University of Tokyo (UT) aims the pursuit of truth, creation of knowledge and nurturing people of leadership qualities who possess a global character and a pioneering spirit, and thus the University serves the global public. The School of Engineering at UT interpreted the aim into its ‘Bilingual Campus Plan’ to provide the global environment without moving from home, supported by the strengthened academic support function. This paper first compares global(isation)- and international(isation)-related concepts, surveys the trend of global and international education, and defines the global leader education with its content. It then shows the policy and structure of global leader education system for the School of Engineering, UT and demonstrates our trial in nurturing the practical capability part of global leader education, called ‘Living Experience of Global Activities’ project course.

Keywords: global leader education, globalisation, internationalisation, practice course, engineering

1. Introduction
Globalisation made a rapid progress and became a buzz word in the end of 20th century. Today, manufacturing, transportation, consumption, and any rapid activities in one country cannot be realised without a connexion with those of the other countries. It is a commonality among the world’s top higher education institutes, needing the globalisation of human resources and promotion of inter-/multi-disciplinary education and research. Globalisation of a university is not only required but also inevitable in the intellectual society. Well recognising the importance of global education in higher education, the Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT) launched so called ‘Global 30 Project’ in 2009, having selected 13 core universities for receiving and educating international students. The University of Tokyo (UT) was selected as one of the core universities in this project.[1]

As one of leading universities in the world, the UT aims the pursuit of truth, creation of knowledge and nurturing people of leadership qualities who possess a global character and a pioneering spirit, and thus the University serves the global public. In March, 2010, it published ‘Long-term Plan for Promoting the University's Internationalisation,’[2] the School of Engineering interpreted this plan into its ‘Bilingual Campus Plan,’ integrating the Global 30 action plan and several ongoing measures for globalisation as well. The plan of the School aims to achieve the following: i) to provide the global environment without moving from home, ii) to provide curricula and university life to grow the multi-cultural mind of both Japanese and international students, iii) to strengthen the academic support function for them, and with these all, iv) to establish the global leader education foundation.

This paper first compares global/globalisation and international/internationalisation and surveys the trend in global and international education. Based on this discussion, it defines the global education as education to be prepared for global activity and globalisation, with a broader concept than that of international education. The paper then defines the global leader education in the engineering field and presents its elements, including the total leadership and global communication capabilities. Based on these discussions, the paper shows the policy and structure of global leader education system for the School of Engineering. Finally, the paper demonstrates our trial in nurturing the practical capability part of global leader education, called ‘Living Experience of Global Activities’ project course, which was initiated by the Center for Innovation in Engineering Education (CIEE) in cooperation with a global company.

2. Global and International Education
This section first compares the meanings of global, globalisation, international and internationalisation. Then, it clarifies how the global education should be differentiated from the conventional sense of international education. It further surveys the current global/international education in the world, for the discussion on the global leader education in Sect. 3.

2.1 Global/Globalisation vs. International/Internationalisation
‘Global’ and ‘international’ are often interchangeably used, but also differently used in not a few cases. It should be noted that ‘international education’ in Western countries usually means the education for foreign (or international) students. These words should be differentiated as follows:
- International: ODE (2003) * defines this word as: i) existing, occurring, or carried on between nations, ii) agreed on by all or many nations, and iii) used by people of many nations. Its basic meaning is connected with
framework/authority of nation state.

- **Internationalisation**: This means a relationship of ‘nation vs nation’ or beyond national border in any of thinking, positioning, activity or communication in a bi- or multi-lateral way. International education of educational institutes usually means the education for a person who crossed or is to cross a border. This interpretation is common in the Western countries. Since the modern definition of country/state is a nation state, the international education should include culture and people aspects; however, this has not yet been a mainstream.

- **Global**: ODE (2003)* gives its definitions as: i) relating to the whole world, worldwide, and ii) relating to or encompassing the whole of something, or of a group of things. That is, ‘global’ means worldwide and whole globe level. An older edition dictionary, LDCE (1984)** gives a definition ‘of or concerning the whole earth,’ which conveys a physical sense rather than one.


**Globalisation**: There exist a number of papers and books discussing globalisation,[3][4][5] According to Nye-Donahue [3], ‘as “interdependence” did in the 1970s, “globalisation” became a buzzword in the 1990s. However, the phenomena they refer to are not entirely new.’ The modern version of globalisation began in the 19th century, after the emergence of a nation state in which the concept of nation defined a state. Reference [3] explains that globalisation is ‘a state of the world involving networks of interdependence at multi-continental distances.’ It also notes that the meaning of globalism is ‘multiple relationships, not simply to single linkages, through any flows and influences of things, information, ideas as well as environmentally and biologically relevant substances.’

### 2.2 Education to Be Prepared for Global Activities / Globalisation – Global Education

As discussed in Sect.2.1, ‘global/globalisation’ have an entire networked view of factors or activity in question, free from the concept of nation or nation border. Therefore, education to be prepared for global activities / globalisation, which the paper calls global education, has a broader concept than that of international education. That is; by global education a student learns what and how a person is required to think and do to play in a global context, with an overview on and understanding of varied objective-oriented networked activities/factors in addition to a traditional international sense. The aim of global education at UT is to send talented graduates who play a leading role out to the world, which we call here ‘global leader education.’ It comprises global communication skill, leadership, broad view, thinking skill, imagination, creativity, pioneering spirit, etc. Section 3 explains these in more detail.

The wide spread Internet transformed the world into a networked cyber space, which has added a sense of ‘virtual/virtualised’ to ‘global/globalisation.’ On the other hand, a word ‘international’ still seems to keep a physical sense. Therefore, a global leader needs to understand all of the physical, logical and cyber worlds. One example of global in a virtual sense is a global consortium activity. It is an objective-oriented activity rather than a negotiating one among nations, seen in traditional international standards making.

### 2.3 Worldwide Trends in Global Education

This section takes a glance at the status of trends in global/globalisation education in higher educational institutes.

1) **Japan**: Global and/or international education has recently been a key word. However, its reality is still a level of a collection of lectures on English skill, those taught in English, overseas internship, and double degree/major system tied up with foreign universities. There found no global education in the sense discussed in Sect.2.1.

2) **Europe**: International cooperation in European higher education (HE) has been based upon well-known Bologna Process or Bologna Accords (signed by 30 countries in 1999.) The common framework is to set academic degree standards and quality assurance standards, aiming European common degree system and European Credit Transfer and Accumulation System (ECTS). The aim is to bring the value of European HE graduates to a higher position. Although it includes a cross cultural view, it is not consistent with global education by the definition in Ref. [3].

3) **US and UK**: A number of communication courses are offered in any university, regarding their mother language, English, which ‘happened’ to become a global common language. However, there found scarce practice courses to educate global leaders. Searching the web sites of major universities with key words, ‘global’ and ‘global education,’ results in a list of courses about foreign culture, liberal arts or literature study. One exception is found in MIT's LGO global management course, which aims an MOT like function as a joint MBA and Engineering activity. [7]

4) **Joint, double or dual degree (note)**: This system allows a student to earn two degrees at one time. Education regarding Joint degrees from two universities in different countries is usually made in English. It aims to link the different discipline areas, rather than to educate multi-cultural perspective and activities. Many Asian universities utilise this system tied with famous US universities as their distinguishing and appealing characteristic.

Note: The present paper does not differentiate these which are often used in a similar or the same meaning.

### 3. Global Leader Education

#### 3.1 Basic Elements of Total Global Leader Capability

Any person who should be a leader in the society needs the following knowledge, skills and capabilities, which have to be constructed over the basics as a specialist or a generalist:

1) **Thinking skill**: thinking at a qualitatively higher level of thinking triangle; i.e., latter elements of a know-comprehend-apply-analyse-synthesise-evaluate cycle,

2) **Problem identifying/solving skill**: identify unknown problems and find or create solutions by his/her own efforts,

3) **Global, economic, social and multi-disciplinary knowledge/interests**: with a greater focus on systemic constructs...
and outcomes, and practical experiences for this,

4) Understanding of and communication with different cultures: global literacy as a bi-directional communication sense and capabilities on expression, presentation, writing, discussion, negotiation in mother and foreign languages,

5) Strong ethical view: understanding the product life-cycle with a view to present to future environmental change,

6) Lifelong learning: learn new things all the time,

7) Project execution capability: leadership bridging public policy and technology, balancing between performance (subject) and maintenance (human), and having a pioneering mind.

A set of the above items is called ‘Ningen-ryoku’ in Japanese, which literally means human capability. There found no English equivalent word although there are similar concepts called ‘people skills’ or ‘social skills’. Hereafter, we call this total leadership plus communication capability as ‘total global leader capability.’ Several items in the above list are not new, as shown in ref. [8]. However, understanding different cultures and total capability explained in the above items 3) and 4) should be stressed as especially important basics for nurturing the global leaders.

3.2 Consideration for Japanese Engineering Students

It is the mother language for any person to construct his/her logical ideas; without this power of logical expression in the mother tongue, anyone cannot express himself/herself logically in any foreign language. Therefore, it is essential for Japanese students raised in Japanese environment, first to build solid skill on logical thinking and communication in Japanese. That is, the above ‘total global leader capability’ should be learnt in both Japanese and foreign languages together as much as possible at an early stage. Many of the global education elements listed in Sect. 3.1 are constructed over the base of speciality knowledge and skills. Therefore, education using a foreign language is also necessary for both speciality basics and applied areas. A structure will be:

1) Common requirements for the engineering students:
   i) Firstly, build the logical thinking, expressing, communication skills in Japanese, and
   ii) Then build the foreign language communication skill, while comparing materials with the case in Japanese.

2) Engineering basics and speciality:
   i) Attain expressing capability in a foreign language regarding the engineering basics such as mathematics and physics: This will include glossary, how to read formula, symbols, basic expressions, etc. and
   ii) Then, progress stepwise to the stage of speciality, firstly its basic unit and then applications.

3) Further, broaden the knowledge and skills on a variety of issue-oriented and multi-disciplinary subjects: Learn first common basics and then applications with practical cases from global/globalisation view, and

4) Through the above process, be prepared for practising in a global environment, and experience any real project activity. Educational organisations should provide a variety of opportunities for this purpose.

Regarding foreign students, it is important for the university to prepare a means and systems similar to the above to support their learning of Japanese expression / communication capability. By implementing a combined Japanese and foreign language environment with the university’s strong organisational support, a bilingual campus will be realised for foreign and Japanese students to learn, do research and spend their university life in an integrated manner.

4. Global Leader Education at the School of Engineering, UT

This section explains the framework of global leader education initiated by the School of Engineering.

4.1 Elements of Global Leader Education

The first two years of undergraduate students at UT are for a distinctive general education at the College of Arts and Science. This stage is well linked with speciality programmes of the 3rd and 4th years at Hongo campus and further postgraduate programmes. Engineering and science education is structured according to speciality knowledge and curriculum. Global education is designed throughout the undergraduate and postgraduate programmes. The School of Engineering has been implementing the items listed in Sect.3.2 based on the following principles:

| Common Requirements, Basics | Self-navigated, self-learning using the SNOWBALLS * |
| Application, Practice, Experience | Practical project courses, seminars |
| Global literacy | Fixed format / Pre-structured, e.g., writing, glossary, basic expression |
| | Ad-hoc/unstructured, e.g., debate, practice, project |
| | SNOWBALLS * |
| | Lecture, seminar, project, etc. |

* Self-Navigation Web-Based Literacy Learning System (registered trademark)

The CIEE has been taking the lead in prototyping IT systems such as SNOWBALLS modules, developing programmes such as practice project courses as well as the evaluation of teaching and learning methods.

4.2 Practice Course, ‘Living Experience of Global Activities’ Project

This section describes a trial course to nurture a practical capability in global leader education, called ‘Living Experience of Global Activities’ project course. It was conducted under the partnership of the CIEE and the Japanese operation of a global company, Cisco Systems G.K., in the last winter term. The course implemented major practical elements of global leader education to provide the global environment without moving from participants’ locations, linking five major cities in the world.

1) Course structure

Global companies have abundant experiences in not only the global business but training/education of diverse employees, which are useful for and can be modified to be applied to higher education. From this point of view, the project course was designed as a new tool for increasing students’ practical experience/skill also, which is much...
easier to participate in than the internship of usual format. The trial course was conducted from October 2009 till the end of January 2010. It was designed to include the practice elements of the global leader education as follows:
- Preparatory lectures on world business, life trend and business management (classes 1-3),
- Communication/negotiation practices followed by presentation practices (classes 4-7)
- Global team negotiation practices via ‘Telepresence’ and web communication systems (classes 8-11)

2) Major unique features
- Globally mixed teams: Four global teams competed remotely with each other, each located at Tokyo, Shanghai, Singapore, Sydney and Texas. For this, preparatory sessions were provided at each location.
- Diverse members: Participants included UT postgraduate/undergraduate students (9) and Cisco intern students from a variety of overseas universities (2-3 from each location). For the latter students, the programme was offered as an additional activity.
- Utilisation of ICT system: High-vision Telepresence*, WebEx™ *, etc. provided real presence for real-time debate as well as off-line communication. * Product names of Cisco Systems.
- Real case study: Practice sessions on negotiation and presentation adopted a real ongoing theme related with both education and industry so that participants should feel the theme directly connected with their life.

3) Evaluation
The evaluation on participants’ progress, the effectiveness of T&L methods including use of Telepresence, and the course as a system were conducted by using a variety of measures, such as each participant’s self-evaluation on the achievement level of his/her objective set beforehand, intermediate/final presentations, reports to an assignment at each class and responses to participant check, and system performance monitoring at each class. Major findings are:
- Participants significantly improved not only English communication skill but expression and thinking skills,
- All participants mentioned that; i) this course was the first step stone to the next stage, and ii) they each set their future goals to continue self-development towards these, and
- The ICT systems effected a new style of global education method. Recognised issues are complicated session controlling of parallel multinational teams’ debates through Telepresence with associated systems.

3. Conclusion
It is the global leaders who try to present solutions for global issues and practice these. Higher education institutes should recognise again that nurturing the global leaders is their significant obligation to future society. The paper presented the policy and practical example of the UT’s global leader education system, considering the current status of the global/international education in the world. We defined the global leader education as that to be prepared for global activities / globalisation, with a broader concept than that of international education, including the total leadership and global communication capabilities. Based on this discussion, the paper demonstrated a successful trial on a project course initiated and implemented jointly with the CIEE and a global company comprising international practice sessions. This project course was highly rated by participants, who achieved significant skill improvement, and has established a successful new model for ‘global leader’ education. Future issues include enhancing the course to multi-national company based one, establishing the UT global leader education system and further implementation of the Bilingual Campus Plan.

Acknowledgement
The authors would like to express sincere gratitude to Mr Kenji Osabe and Ms Yuriko Kawamoto for their valuable contributions under partnership with Cisco Systems G.K. and the School to realise the project course.

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Biography
Makoto YOSHIDA, emeritus professor at the University of Tokyo, received his PhD from the UT, has considerable experiences in ICT, its management and engineering education, and is TeleManagement Forum Distinguished Fellow, IECIE Fellow and JSEE Special Professional Engineering Educator. Member of IEEE, IECIE, IPSJ, the Engineering Academy of Japan, JSEE and JNSA.

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