Fostering IT-majored Global Human Resources: A Faculty's Approach

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Abstract—**This Work-in-Progress in the Research to Practice Category paper will present our faculty-led challenges in preparing IT-majored students for the global environment. The global IT human resource development in Japan in recent years is always being challenged specially with the Japanese younger generation's 'inward tendency' despite the ever-growing demand for such resources equipped with comprehensive skills. The Japanese government took initiative to encourage higher education institutes to put efforts on fostering human resources who can succeed in the current global community. We, College of Information Science and Engineering, Ritsumeikan University, were focusing on globalisation in IT field from an early stage and trying to establish a path for students to be prepared for a global environment. In 2012, we were selected for the Japanese government funding project. Through the five-year project, we built a foundation for faculty-led global IT human resource development environment. In addition, we have been organising faculty-led study abroad programs for many years. Questionnaire surveys were carried out in 2018 and 2019 for evaluation of outcomes of study abroad programs. The survey results enable us to conclude that our study abroad programs increase students' motivation in studying English and academic subjects. This paper shares our faculty's approach and contributes to all the other universities which have the same challenge in preparing information science and engineering students for the global environment.**

Keywords—global environment, global human resources, faculty-led, study abroad programs

I. INTRODUCTION

The rapid advances in information and communication technologies (ICT) which began in the 1980s accelerated further in the 1990s and continue on today, progressively shifting our world toward globalisation, borderless societies, and intense international competition across industries. Japan faces the challenges of a dwindling and ageing population, geographic vulnerability to natural disasters, and emerging economies which have grown quickly into formidable contenders, all of which have eroded our nation's global competitiveness. Institutes of higher education are increasingly called upon to respond to the longstanding, urgent need to produce human resources who can help guide us toward growth and prosperity in the contemporary context.

Since 2010, the Japanese government has implemented grants and subsidies led by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), including the "Re-Inventing Japan Project (2011)" [1], "Go Global Japan (2012)" [2], "Japan Public-Private Partnership TOBITATE! (Leap for Tomorrow) Study Abroad Initiative: Young Ambassador Program (2013)" [3], and "Super Global University Project (2014)" [4]. These programs aim to encourage Japanese students to study abroad and/or acquire the skills to compete in the international community.

Our nation urgently needs STEM professionals, especially ICT engineers, to attain higher levels of expertise and international competitiveness. The Ritsumeikan University, College of Information Science and Engineering (CISE) responds to this need by engaging in the development of globally minded IT professionals.

CISE describes the human resources it aspires to develop as: (1) being equipped with solid expertise and creativity, (2) having proper ethical outlooks and high career consciousness, (3) being prepared to take active roles in the international community, and (4) being capable of using sophisticated information technologies appropriately. It is clear from this description that CISE's "global *jinzai* (global human resources)" are not merely individuals with excellent English language skills but engineers and researchers with deep knowledge and a high level of expertise in a specialised field of information science, fundamental competencies for working persons (known as *shakaijin-kisoryoku*[1]), and the ability to contribute in a global context.

On the basis of this philosophy, CISE has been trying to foster globally minded professionals. However, what CISE did not offer was a structure of delivery to be fitted with not only excellent English language skills but also deep knowledge and a high level of academic expertise, rather simply ad-hoc opportunities.

How CISE can establish an educational path to a successful global minded human resource was a long-standing concern. In addition, starting a new move within a college requires a lot of effort and money, which was a bottleneck of the concern. Japanese government's grant was a real timely offer. CISE was selected for a five-year grant under the foregoing MEXT-led Go Global Japan Project and launched the Global Human Resource Development Leading Program (popularly known as "Mirai Academy"), a central pillar of our initiatives. We have continuously engaged in various initiatives aimed at developing globally minded professionals since then.

The main objective of this paper is; 1) to explore whether a faculty can establish a systematic approach and 2) to answer the research question: What IT-majored students learn from the lived experience of overseas internship.

II. MIRAI ACADEMY

A. Overview of Mirai Academy

Mirai Academy (MA) is a non-credit certificate program (certificate issued by CISE). Students who enrol must take several classes in addition to their regular course load. MA aims for balanced development of three capacities, academic expertise, English proficiency, and *shakaijin kisoryoku*. It offers two courses: the Regular Course, for which students are recruited from each year of university (applicants who pass the screening are called "Academy students"); or the Open Course, which is not limited to Academy students.
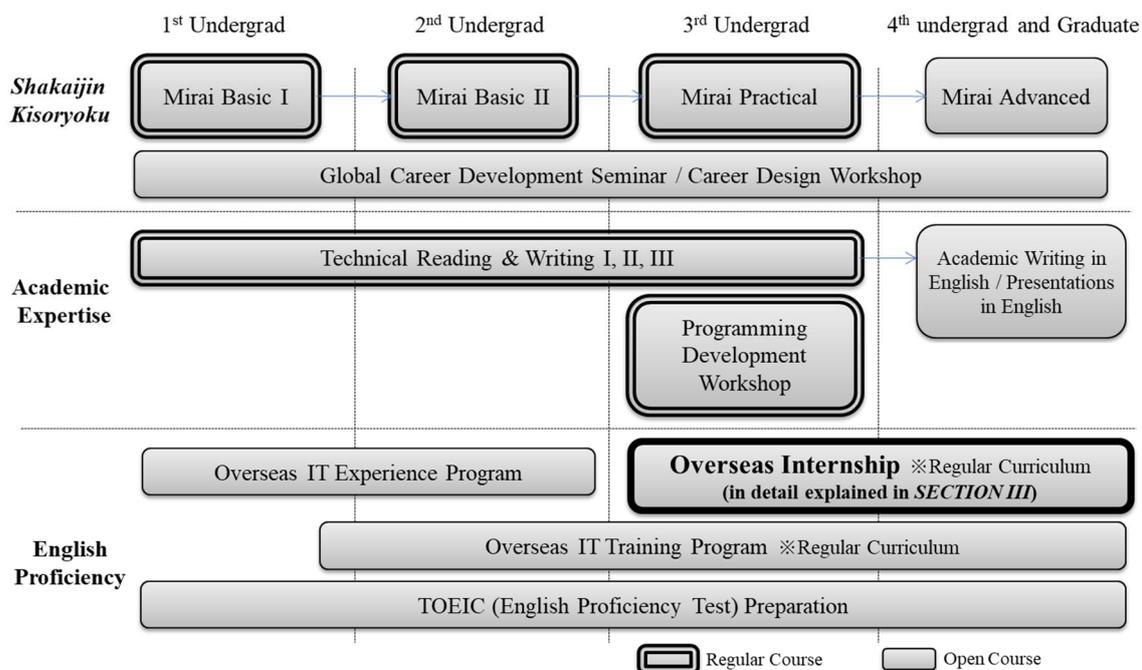

Figure 1: Mirai Academy curriculum

Outlines of the MA Regular and Open Courses are shown in Figure 1. The Regular Course consists of classes for developing *shakaijin kisoryoku* (e.g. communication skills, presentation skills, and teamwork) as well as technical reading and writing skills in English. The continuous, systematic structure is designed for step-by-step acquisition of the three capacities required of IT professionals in the global workforce.

The Open Course, offered to all CISE students, includes TOEIC Listening & Reading Test preparation, Chinese language classes, and the Global Career Development Seminars featuring lectures by renowned business leaders. Additionally, mechanisms such as overseas IT practicums, overseas internships, and intra- and extramural programming competitions are in place to encourage students to practice what they have learned in the Regular Courses, so that they may back their knowledge and skills with experience.

Students who take and complete all of the Regular Course classes are granted the MA Completion Certificate. Students who complete the Regular Course and who meet the predefined criteria are certified as "Global IT Human Resources."

B. After completion of subsidy program

Once the fully subsidised 5-year period ended, steps were taken to enable the initiatives to be continued independently.

Specifically, the content of the MA Regular Course "*Shakaijin Kisoryoku* Development" for 1st year undergraduate, and the "Technical Reading and Writing" course for 3rd and 4th undergraduate and graduate students, were incorporated into the regular curriculum.

Now that all CISE students were eligible for the MA program instead of only those who had passed the Academy screening process, we no longer had to distinguish between Academy and non-Academy students, and therefore discontinued new recruitment for the Academy in AY2016, shifting to a system whereby all newly enrolled CISE students could aim to become Global IT Human Resources. The MA Open Course initiatives, including the TOEIC preparation course, social events with CISE's foreign students, and Global Career Development Seminars, are now part of "Mirai Academy NEXT" which is internally funded.

III. OVERSEAS INTERNSHIP PROGRAM

A. Importance of Study Abroad Programs

In March 2015, MEXT announced the "Strategy for Developing Human Resources in Science and Technology" [5], in which STEM study abroad program enrichment is a focal point. The Strategy aims to "set up programs incorporating study abroad into the curriculum, and systems for credit transfers with foreign universities, to promote study abroad in STEM fields which, due to their curricular

requirements of practicums and lab work, require some effort in securing time to go overseas."

Furthermore, the June 2016 MEXT "Committee of Inquiry into University Level Engineering Education" states, "graduates of bachelor's, master's, and Ph.D. programs of engineering have many opportunities to work overseas ... it is desirable to promote overseas internships and study-abroad programs as opportunities to make students aware of 'competition' with other countries" [6], highlighting the importance of overseas study programs for STEM students.

Inward orientation aside, the annual Japan Student Services Organisation (JASSO) Survey of Japanese Students Studying Abroad Based on Student Exchange Agreements shows the number of Japanese students who study abroad has been increasing steadily since the survey began in 2009, exceeding 100,000 in 2017 [7], with more than 60% of stays being short-term, under one month. To accommodate this trend, universities are offering more short-term study abroad programs, and the number of students who go on such programs is likely to keep rising.

B. CISE's Overseas Internship Program

As previously described, CISE's "global *jinzai*" is not merely an individual with excellent English language skills; he or she is also a skilled engineer or researcher with *shakaijin kisoryoku* and the ability to contribute in a global context. On the basis of this philosophy, CISE currently offers six IT Training Overseas Programs (four in the summer holiday and two in the spring holiday) and Overseas Internship Program with four destinations (USA, India, Vietnam, and China), both of which are credit-earning, to prepare graduates for the global workplace. This paper focuses on the Overseas Internship which was launched in AY2014 as part of the Go Global Japan initiative.

Historically in Japan, internships were considered to be just a work experience, and it is only recently that internships have been recognised as a part of university education [8]. Hence, not many universities offer overseas internship program that aligned with the student's major. Many of internship programs' contents are left up to the host companies and, in most cases, they are merely working experiences.

According to the Ministry of Economy, Trade and Industry, internships are effective from the three perspectives: "career education," "liberal arts education," and "academic education" [9]. In addition, implementation of overseas programs including overseas internship is being actively promoted in Japan and importance of overseas programs for STEM students are addressed [6]. Not only for an educational purpose, overseas internship experience also gives an edge during job-hunting for STEM students [10].

On the other hand, not many Japanese universities offer university-led overseas internship programs. According to the survey carried out by MEXT [11], only 27.2% (205 out of 754) undergraduate school and 10.8% (68 out of 629) graduate school has conducted overseas internship programs. These numbers are relatively low compared to domestic internship programs' implementation rate which are 72.4% (546 out of 754) and 24.2% (152 out of 629), respectively. It is obvious that overseas internship programs are not yet established as part of Japanese education curricula.

As aforementioned, CISE's overseas internship program was launched in AY2014. It was a CISE'S long-standing challenge that many of our students did not have a clear idea how their academic knowledge and skills learned thought university education are applied in a real working environment. CISE saw Go Global Japan funding as a good opportunity to launch overseas internship program. This launch was initiated to answer the research question: What IT-majored students learn from the lived experience of overseas internship.

At the launch of the program, CISE set a first priority on providing students lived experiences in IT field; not just a working experience but working as a member of a company. On the basis of this idea, we have selected the host companies. All of the internship programs' contents/tasks are reviewed and agreed by CISE academic members and are based on a comprehensive understanding of global IT human resource's responsibilities.

CISE has conducted a series of questionnaires for the participants to confirm the educational effectiveness of the program [12][13] which also answers the research question "What IT-majored students learn from the lived experience of overseas internship." Followings are some of the responses on what the participants learnt from the program.

- Importance of English. (More than one participant responded.)

- I felt that my expertise knowledge and skills are not good enough to work in a company, so I started studying outside of the classroom to gain more knowledge.

- What is required in the world changes every moment, so I have to be able to cope with the speed in order to make a living in such world. I also found out that I need the ability to build smooth interpersonal relationships with people in the workplace.

- I could see the link between what I learn in the university and how the knowledge and skills are used in a company and the society. It motivated me to study harder.

- To be successful in a global environment, I must be globally competent and adept at collaborating with engineers/scientists in other countries specially with whose first language is not English.

From the responses, it is obvious that participants were able to picture what they want to learn and what kind of experience they want to gain in their university life through the internship program. It is fair to say that CISE's overseas internship program has a high educational impact. CISE program offer students a good opportunity to review their abilities and qualities by placing themselves in an environment that is completely different from campus life and daily life in Japan, and fulfilling the responsibility within the evaluation criteria of a company.

C. Challenges of CISE's study abroad programs

Many studies have carried out on the educational effects and advantages of short-term overseas programs. Generally speaking, program participants become more open-minded to the international environment, gain a good cross-cultural understanding, improve foreign language proficiency, and gain communication skills [14][15][16]. Moreover, short-term overseas programs contribute to building confidence [17].

Further research by the author has revealed that participation in the 4-week short-term study abroad program

affected students positively, helping them acquire the attributes required of global human resources [12][13]. In particular, students were highly motivated in studying foreign language and academic subjects upon their return. Although students are not required to take an English proficiency test pre- and post-program, some students have reported improvements in the scores of the test they took voluntarily. Students were likely to have identified the skills and knowledge they lack and to have understood the importance of filling the gap. In addition, most of participants built confidence and increased self-efficacy for language skills, cross cultural understanding and *shakaijin kisoryoku*.

The author's research also found that the positive effect of participating in the short-term study abroad program had weakened after peaking immediately post-return [13]. It was revealed from online questionnaire surveys of AY2018 program participants, carried out prior to departure, immediately upon return to Japan and three months after return to investigate time-related changes in attitude.

A repetitive research of [12][13] was carried out in AY2019 to support our arguments. The comprehensive analysis of the results showed a similar tendency as in [12][13] that made doubly sure the educational effects of short-term overseas programs and how they change over time. The analysis results of the research implemented in AY2018 and AY2019 advocate an important message that we need to develop systems to retain the gains in learning down the road.

IV. FUTURE PROSPECTS

Since around 2010, Japanese youth have earned themselves a reputation for being "inward-oriented", with little interest in going to or learning about other countries. This domestic focus is especially pronounced among STEM students. According to a survey by *Recruit Shingaku Soken*, 38.5% of students majoring in humanities were interested in studying abroad, while only 27.8% of STEM majors indicated likewise [18]. Although the latter figure is an improvement over the 27.6% in the 2013 census, it is still low.

CISE as a faculty with STEM students has developed a foundation to prepare them for a global environment through "Mirai Academy" and study abroad programs. Now that some of Mirai Academy initiatives are incorporated into the regular curriculum, CISE students undertake the path to grow a global mind and become global human resources whether they like it or not. Yet CISE's study abroad programs remain one of the most effective means to develop global human resource.

Although we know that some of Mirai Academy graduates are working on a global scale, we have not yet followed up the all Academy students after their graduation. How our five-year grant project contributed to foster global minded human resource must intrigue anyone who are engaged in global competency education. We would like to, in near future, conduct a comprehensive follow-up survey and investigate the fulfilled Academy's duty. The results will be of help to global human resource development. In addition, the results will support CISE to improve Mirai Academy NEXT activities to be more practical and effective.

Regrettably, fewer and fewer CISE students are participating in study-abroad programs. Possible reasons include not only the cost but also lack of confidence in speaking foreign language, lack of can-do spirit, a high employment rate, and/or unappreciation of its benefits.

Going forward, we will continue to leverage our study abroad programs in the development of global IT human resources, constantly updating and enriching program content and communicating their importance to students. At the same time, we are aware that cost considerations keep such programs out of the reach of many students. We must keep creating opportunities through Mirai Academy NEXT initiatives so that our students can cultivate a global outlook even if they cannot afford to join overseas programs to do so.

V. CONCLUSION

We described the global human resources which CISE aims to develop and introduced our faculty's unique initiatives over the past several years. We elaborated Mirai Academy which was CISE's 5-year government-subsidised extracurricular program, and the current situation after the subsidy expired. We then explained the background of our recently launched overseas internship program and concluded with our future prospects.

The contribution of our approach can be summarised into two aspects: first, we have proven that a faculty can establish an educational path embedded in its curricula which aims to foster truly global-minded resources; second, the recently launched faculty-led overseas internship program is viewed to have contributed significantly to the development of students' motivation for various fields. We admit that this challenge requires a long-term commitment and not all full contribution of this research appear immediately. In years to come, when CISE recent graduates reach mid-career stage, we may see even more interesting results of our effort.

Without question, CISE is geared toward fostering engineers and researchers equipped with comprehensive skills. In future, we will continue to analyse the skills that society demands of ICT engineers in our implementation of global human resources education.

NOTE

1. Fundamental Competencies for Working Persons: *Shakaijin-kisoryoku* in Japanese, defined by the Ministry of Economy, Trade and Industry in 2006 as the competence to do work in the workplace and in society. *Shakaijin-kisoryoku* consists of the "ability to take action," "ability to think," and "ability to have good teamwork." "Ability to take action" signifies being able to act on one's own initiative, influence others, and achieve goals. The "ability to think" entails the ability to identify issues, plan ahead, and be creative. The "ability to have good teamwork" means being able to communicate, listen to others' opinions, understand opposing views, grasp the situation, have discipline, and control stress.

   Corresponding words to "*Shakaijin-kisoryoku*" in other countries are, for example, Core Skills (UK), Essential Skills (New Zealand), Necessary Skills/Workplace know-how (USA), Critical Enabling Skills (Singapore). (National Centre for Vocational Education Research, "Defining Generic Skills: At a Glance," 2003, National Centre for Vocational Education Research)

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