

PROPOSALS FOR VISUALIZATION AND SUPPORT OF GENERIC-SKILLS THROUGH OVERSEAS INTERNSHIP

K. Yajima, K. Kawasaki, K. Okamoto, Y. Kubota, T. Shirane, H. Kobayashi, K. Baba and H. Fukumura

National Institute of Technology, Sendai College, Sendai, Japan

ABSTRACT

National Institute of Technology, Sendai College (Sendai KOSEN) has been engaged in global education for students by offering them internship programs at overseas universities since the early 2000s. Currently, several programs are being implemented, e.g. short- and long-term internship, internship at foreign companies and so on. By dispatching students to overseas internship programs (OSI), we are focusing on the development of the global mindset of the students. A continuous survey on the Generic Skills (GSs) of students using an objective method, meanwhile, started in 2014. Since five years have passed since the survey started, it has become possible to measure the growth of Generic Skills objectively before and after their overseas internship. It is reported the results revealed that their GSs trend before dispatch of students who want to participate in OSI and growth characteristics of their GSs between before and after dispatch. By utilizing this PROG continuous survey, it is thought that effective and individual pre- and post-support can be realized for students who will participate in OSI.

KEYWORDS

Visualization of Generic Skills, PROG, pre-support, post-support, Standards 11, 12

BACKGROUND

Since first signing an agreement on Academic Exchanges with INHA Technical College in Korea in 1991 and then with Helsinki Metropolia University of Applied Sciences in Finland in 2002, Sendai KOSEN has signed the agreements with 10 universities in the European region and 5 universities in the Asian region. In these agreements, exchanges of students are included. Therefore, Sendai KOSEN is committed to fostering a global mindset of our students by dispatching our students to OSI and accepting international students for our school programs.

As part of quality assurance of education, on the other hand, a continuous survey of students' GSs, abilities to comprehensively adjust to society, has been conducted from the academic year 2014. Through these continuous surveys, it is possible to know the GS characteristics of the students who want to participate in OSI and the GS growth between before and after the internship. The results of these surveys can be used to improve the contents of pre- and post-guidance and supports to make OSI more effective.

OVERSEAS INTERNSHIP PROGRAMS AT SENDAI KOSEN

Sendai College has several overseas internship programs, which are outlined below.

- 1) A program to dispatch 5th grade students of regular course to the universities in Finland, France or Thailand for about 5 months
- 2) A program to dispatch 1st grade students of advanced course to summer schools of Helsinki Metropolia University of Applied Sciences in Finland or King Mongkut's Institute of Technology Ladkrabang in Thailand for 2 to 4 weeks
- 3) A project-type training program that accepts international students for 6 week to 5 months
- 4) A program to dispatch 1st grade students of advanced course to foreign companies for several months (up to 3 months) and so on.

In this paper, the differences of GS growth characteristics between the students who participated in a 5-month OSI (#1, longest program) and those of other students from Hirose campus are reported. Participation conditions for #1 program are TOEIC score of 400 or higher, and presentation practice in English is provided as advance guidance. After the internship, furthermore, debriefing sessions would be held for the participants themselves to reflect on their experience and also to introduce the program to the students who wish to participate in the following year. By comparing the GSs of the student who participated in OSI with those of other students, some tendencies are observed in the differences in the abilities of students before participating in the internship and the differences in growth characteristics with and without the participation of OSI. By analyzing these trends in detail, it is possible to achieve more effective overseas internships. For that purpose, we will introduce the results of the differences in GS growth with and without overseas internship participation of our students.

EVALUATION METHOD OF GENERIC SKILLS

In order to quantify GSs, there are two representative methods, that is, direct evaluation using rubrics, and indirect evaluation using external assessments. Progress Report on Generic Skills (PROG), one of Japan's standard tests (Kawaijuku Group, 2019), was adopted in this survey because the test has advantages of eliminating evaluators' subjectivity and of being able to use for comparing our students' results with those of university students. Since Ito (2014) reported the assessment of PROG as an useful assessment tool, the results of PROG have been used in the evaluation of educational effects and proposals for new educational methods, for example, the proposal of A³ Learning system of Takahashi et al. (2016) and the combination with other educational tools of Takahashi et al. (2020).

The PROG consists of two parts: Literacy part, which evaluates the examinee's ability to apply knowledge to solve new or inexperienced problems, and Competency part, which evaluates the examinee's coping abilities with their surroundings, including decision making or action principle characteristics.

Literacy part consists of questions such as numerical reasoning and text comprehension. In Competency part, there are many questionnaire-type questions for examining behavioral characteristics. For example, to a question "When talking with a person you are new to, how do you act?" the answer should be in a five-scale rating from "Very friendly" to "Very politely." The evaluation of each component in this part is quantified by comparing the statistically

processed exemplary answers of 4,000 Japanese businesspersons who were rated as “excellent”. PROG test scores are rated either from 1 to 5, or from 1 to 7, depending on factors, in both Literacy and Competency parts, with larger numbers indicating better results.

Table 1. Evaluation elements of PROG

Evaluation elements of literacy part			
Literacy	Collecting information		
	Analysing information		
	Identifying problems		
	Forming strategies		
	Linguistic Processing Skills		
	Nonlinguistic Processing Skills		
Evaluation elements of Competency part			
Competency	main (3) categories	medium (9) contents	small (33) components
	Teamwork skills	Relating with others	Approachability
			Attentiveness
			Interpersonal interest/Empathy/Receptiveness
			Diversity understanding
			Building up a network of connections
		Trust building	
		Cooperating with others	Role understanding / cooperative action
			Information sharing
			Mutual support
	Consultation / guidance / motivating others		
	Team management	Talk to each other	
		Express opinions	
		Constructive/Creative discussion	
		Opinion coordination, negotiation, persuasion	
	Personal skills	Self control	Self-awareness
			Stress coping
			Stress management
		Self confidence	Understanding of identity
			Self-efficacy / optimism
			Personal Transformation by learning view/opportunities
	Behavior control	Subjective action	
		Outworking	
		Getting into the habit of positive actions	
Problem solving skills	Problem identification	Information collection	
		Understanding of the essence	
		Cause investigation	
	Planning solutions	Goal setting	
		Scenario modeling	
		Plan assessment	
		Risk analysis	
	Implementing solutions	Practical action	
		Correction / adjustment	
Verification / improvement			

Table 1 shows the PROG evaluation items. As shown in Table 1, many of the elements of the PROG evaluation correspond to those described in the CDIO syllabus2.0 (CDIO, 2019). In particular, Teamwork skills and Personal skills of PROG (major categories of competency) are equivalent to Interpersonal skills: teamwork and communication and Personal and Professional skills and attributes in the syllabus, respectively. Many presentations on the development of these skills were made at the 15th International CDIO Conference, and the development of Generic Skills is now one of important topics.

RESULTS OF THE SURVEYS

Information of the Surveys

The target students in these surveys are those who were dispatched to 5-month OSI program in their 5th grade (#1) and took the PROG in the academic years before and after the dispatch. Specifically, it targets 5th grade students in the academic years of 2015, 2016 and 2017. In 2015, eight students were dispatched to OSI, and all six of them took the PROG in their 4th grade and in the 1st grade of advanced course, respectively. Similarly, eight students were dispatched in 2016, and six and three of them took the test at 4th grade and at 1st grade of advanced course. For 2017, 10 students were dispatched, and eight and four of them took the test in the 4th grade and in the 1st grade of advanced course. (As for the PROG examination, only those who want to take the examination, so the dispatched students and the students who took the examination do not match. In addition, since some students did not go to the advanced course, the number of students who took the test in the 1st grade of the course is further reduced.)

The students in the survey did not differ significantly in the curriculum compared to other students, except that they participated overseas internship in their fifth grade. Despite the differences in elective courses at regular and advanced course, all students study in curriculum of electronics and information. Therefore, it is considered that the difference between the students who participated in the internship and other students is due to the difference whether they participated in overseas internship.

Generic Skills characteristics before Dispatch: Comparison between Students were Dispatched to OSI and Others

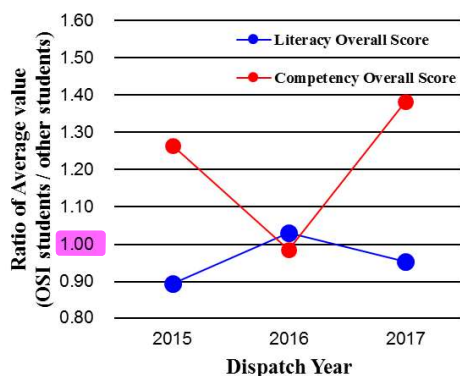


Figure 1. Comparison of Overall scores between OSI students and other students. (“OSI students” means the students who participated in the Overseas Internship.)

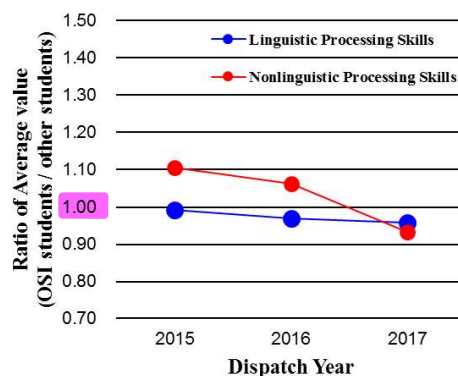


Figure 2. Comparison of Linguistic processing skills between OSI students and other students.

Fig. 1 shows a ratio between the average value of the students who were dispatched to OSI and the value of other students (a value of average score of the students participated in OSI divided by the scores of other students) for the Literacy and Competency overall scores in PROG which they took at 4th grade. If this value exceeds 1.00, it means that the students who were dispatched in the OSI have higher abilities at the time of the 4th grade before dispatch. As shown in Fig. 1, the value of "Literacy overall score" was between 0.89 and 1.03, and no significant difference was observed in any year. On the other hand, with regard to "Competency overall score", the scattered results were observed. In 2015 and 2017, the scores of student were dispatched OSI were much higher. Especially in 2017, the ratio was a very high value of 1.382, which represents a significant 1.25 point difference in the PROG score. Fig. 1 shows that the students who participated in OSI tend to have higher Competency skills one year before the dispatch than other students, while there is no significant difference in Literacy.

Next, a comparison of "language processing skills" in Literacy part was shown in Fig. 2, since it is considered that students who wish to participate in overseas internship have higher language skills than others. The ratio of "language processing skills" showed a value of 0.96 to 0.99, which indicates that the students who want to participate OSI do not have high language processing ability in particular. Therefore, it became clear that the level of language processing skills did not match the desire to participate in OSI.

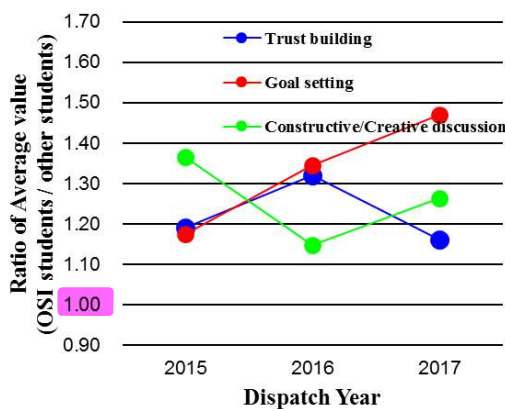


Figure 3. Comparison of elements which were measured higher for OSI students.

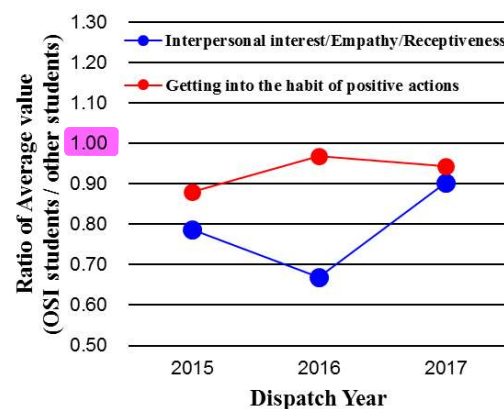


Figure 4. Comparison of elements which were measured lower for OSI students.

Finally, we will examine at the Literacy and Competency elements that make a clear difference between the student who wants to participate in OSI and other students. Fig. 3 shows the results of a comparison of "Trust building," "Goal setting," and "Constructive/Creative discussion," which were measured higher for the students want to participate in OSI in all dispatch years. Regarding the "Building up a network of connections," "Talk to each other," "Express opinions" and "Practical action", in addition, the students who were dispatched to OSI showed higher values each year. Conversely, Fig. 4 shows a comparison of "Interpersonal interest/Empathy/Receptiveness" and "Getting into the habit of positive actions", whose scores of students sent to OSI were measured lower. For other elements, only "Linguistic processing skills" was lower. Fig. 3 and 4 shows that the students who want to participate in OSI have stronger tendencies to be confident in themselves, less swayed by others, and push towards goals.

**GS Growth Characteristics Before and After OSI
(Comparison between Students were Dispatched to OSI and others)**

Fig. 5 shows GS score improvement (the value obtained by subtracting the score at 4th grade before dispatch from the score at 1st grade of advanced course after dispatch) before and after OSI in the evaluation elements of Literacy part. From this point on, the growth of GS was treated as the average of all dispatched years, due to the small number of students taking

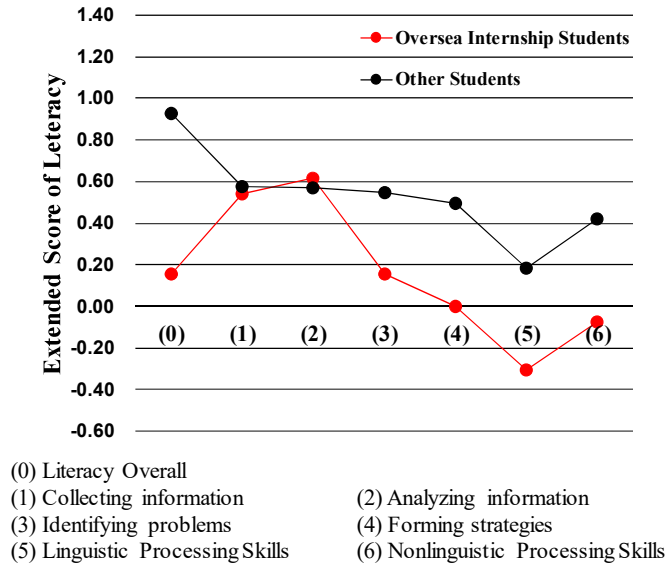


Figure 5. Score improvement in Literacy.

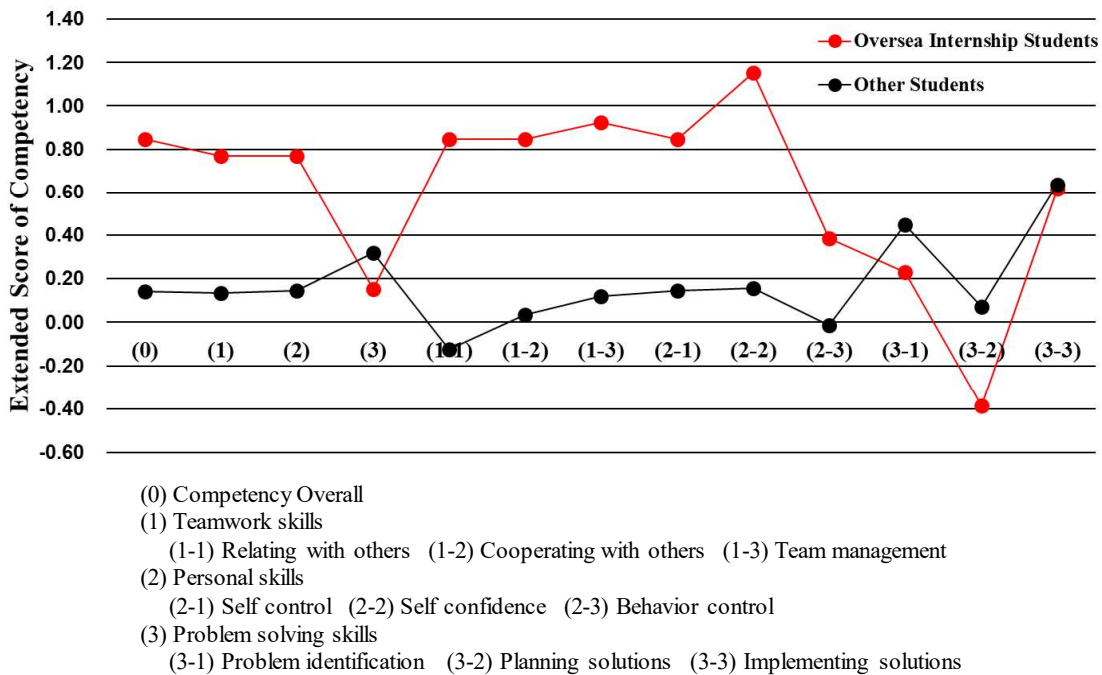


Figure 6. Score improvement in Competency.

PROG at 1st grade of advanced course. It was found from Fig. 5 that score improvement of those who participate in OSI is lower than those of other students. Therefore, regarding improvement of Literacy part skills, it is clear that studying at Sendai KOSEN is better than participating in OSI.

Next, GS score improvement in each evaluation element of Competency part before and after OSI were shown in Fig. 6. In contrast to Literacy, students dispatched to OSI have higher scores for most elements of Competency than others. In the main (3) category, "Teamwork Skills" and "Personal Skills", students dispatched to OSI scored about 0.75 points higher than before dispatch, while the score of students who did not participate in OSI is in the range of -0.2 to 0.2, that is, students dispatched to OSI grew more on the factor than others. On the other hand, it was found that the students who did not participate in OSI had higher score improvement for each element belonging to the "Problem solving skills". Therefore, it became clear that OSI program can efficiently enhance Competency abilities, which are considered to be difficult to improve by just attending lectures. In particular, every element of "Teamwork Skills" and "Personal Skills" grew efficiently.

CONCLUSION

Sendai KOSEN has been engaged in global education for students by offering internship programs at overseas universities since the early 2000s. In this paper, the GSs of Hirose campus students who participated in the 5-month OSI program are surveyed before and after OSI by an objective method.

From the survey before OSI, it was found that the students who want to participate in OSI tend to be more self-confident, be less swayed by others, and push towards goals more strongly than others. On the other hand, it became clear that the level of language processing skills did not match the desire to participate in OSI.

Furthermore, from the comparison of results between before and after OSI, it became clear that OSI program can efficiently enhance Competency abilities. Since Competency abilities, especially personal and teamwork skills, are considered to be difficult to improve in just attending lectures at school, the results of our survey seems to prove the educational effects of OSI (the training experience overseas).

It is considered possible to visualize the effects of the OSI program on GSs by continuing these surveys and conducting more detailed analysis. Since feedback of the visualized effects to the students participating in the internship is expected to make more effective and fulfilling OSI programs possible, we will continue these surveys and analyze the effects of overseas internship by analyzing student OSI growth trends.

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REFERENCES

Kawaijuku Group (2019). About Progress Report on Generic Skills (in Japanese):
<https://www.kawaijuku.jp/jp/research/prog/>

Ito, H. (2014). Assessing an Assessment Tool of Higher Education: Progress Report on Generic Skills (PROG) in Japan, *International Journal of Evaluation and Research in Education (IJERE)*, Vol.3, No.1, pp. 1–10, 2014.

Takahashi, A., Kashiwaba, Y., Okumura, T., Ando, T., Yajima, K., Hayakawa, Y., Takeshige, M., Uchida, T., (2016). A³ Learning System: Advanced Active and Autonomous Learning System, *International Journal of Engineering Pedagogy*, Vol.6(2), pp.52-58, Retrieved from:
<http://dx.doi.org/10.3991/ijep.v6i2.5645>

Takahashi, A., Tohata, Y., Kobayashi, H., Rikitake, Y. & Kubota, Y. (2020). Analysis of students' self-assessment and generic skills using DIFUKU-CHO and PROG test, 7th International Conference on Educational Technologies 2020 (ICEduTech2020), Sao Paulo, Brazil, 2020: <https://icedutech-conf.org/>

CDIO (2019). About the CDIO Syllabus v2.0: <http://www.cdio.org/benefits-cdio/cdio-syllabus/cdio-syllabus-topical-form>

BIOGRAPHICAL INFORMATION

Kuniaki Yajima is a Professor in Department of General Engineering at NIT, Sendai College, Japan.

Koji Kawasaki is an Associate Professor in Department of General Engineering at NIT, Sendai College, Japan.

Keishi Okamoto is a Professor in Department of General Engineering at NIT, Sendai College, Japan.

Yoshikatsu Kubota is a Professor in Department of General Engineering at NIT, Sendai College, Japan.

Takashi Shirane is a Professor in Department of General Engineering at NIT, Sendai College, Japan.

Hiroshi Kobayashi is a Professor in Department of General Engineering at NIT, Sendai College, Japan.

Kazutaka Baba is a Deputy President (in charge of General Affairs) and a Professor in Department of General Engineering at NIT, Sendai College, Japan.

Hiroshi Fukumura is a President at NIT, Sendai College, Japan.

Corresponding author

Professor Kuniaki Yajima
National Institute of Technology, Sendai
College
Department of General Engineering
3-16-1 Ayashi-chuo, Aoba, Sendai, 989-
3128, Japan
+81-22-391-6130
yajima@sendai-nct.ac.jp



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